CHAPTER 4. IMAGERY INTELLIGENCE SYSTEMS, C2 NODES, COMMUNICATIONS INFORMATION SYSTEMS, AND OTHER SYSTEMS

MAGTFs require significant C2 and CIS support to execute IMINT operations. Imagery systems technological developments have the potential to provide the commander with outstanding imagery support. However, the technical (particularly message and data traffic volumes versus available communications channels bandwidth) and operational needs (i.e., routine versus time-sensitive tailored IMINT support) require detailed planning and coordination of CIS support to conduct effective IMINT operations.

"Communications dominate war; broadly considered, they are the most important single element in strategy, political or military."

—Alfred Thayer Mahan

The Marine Corps receives and disseminates imagery as part of the Global Command and Control System (GCCS), via the Defense Information Systems Network (DISN), using Ground Mobile Forces (GMF), digital backbone, tactical radios, and Trojan Spirit II (TS-II). This chapter describes the MAGTF's major current and future IMINT C2 and CIS nodes.

Key to providing the MAGTF commander with IMINT support is understanding the size of imagery data and the capacities of communications pipelines required to transmit this data throughout the MAGTF and to pertinent external organizations. As a general rule, a high capacity (at least T-12) communications pipeline is required for incoming imagery data to the MAGTF, with lesser but still significant capacities required at times for internal MAGTF imagery data dissemination. While most MAGTF requirements can be satisfied via GENSER communications channels (e.g., SIPRNET), the MAGTF must also have SCI communications support (e.g., JWICS) to satisfy some critical requirements.

4001. BASIC IMAGERY INTELLIGENCE COMMUNICATIONS AND INFORMATION SYSTEMS REQUIREMENTS

The standard IMINT CIS requirements for a MAGTF operation are—

- **The capability to C2 subordinate units.** Intelligence officers and IMINT element commanders/OICs must be capable of positive C2 of subordinate units and integration of their operations with broader MAGTF and external intelligence and operations C2. Traditionally single-channel radio and record message traffic have been used to support C2 of MAGTF IMINT units. In semi-static situations, secure e-mail or telephone may be the method of choice, while in highly fluid or mobile scenarios, cellular, SATCOM, and VHF and HF radio may be used.
- **The ability to receive collected data and information from the full range of organic and external IMINT organizations.** The CIS architecture must provide connectivity between organic and supporting IMINT elements (such as the VMU, Manpack SIDS capable ground reconnaissance teams), IMINT analysis and production centers (e.g., JTF's NIST, IIP and MCISU), and supported MAGTF operations and intelligence centers. Requirements include the capability to transmit image data files and IMINT reports digitally via fiber-optics, wire, or

radio in formats (both voice and data) that are readily usable by imagery and all-source intelligence analysts.

- **The ability to provide intelligence to supported commanders.** IMINT CIS requirements will be influenced by supported commanders' intents, concepts of operations and intelligence, command relationships, and standing PIRs and IRs. The CIS architecture must be capable of integrating IMINT element C2 and supporting CIS operations (to include both GENSER and SCI communications) with the primary CIS channels used by supported commanders.
- **The ability to share IMINT products and reports with MAGTF P&A Cell and with IMINT and all-source JTF, other components, theater, and national IMINT and intelligence centers.** The traditional means for providing this capability are MAGTF GENSER secure record and voice communications. While these techniques continue to be used, they are rapidly becoming secondary in importance to the use of JWICS, SIPRNET, and other CIS capabilities that allow participants to access each others' imagery and IMINT products and data bases and to immediately pull required data, intelligence and other IMINT products.

4002. IMAGERY INTELLIGENCE AND KEY RELATED COMMAND AND CONTROL NODES

A wide variety of IMINT operations and supporting C2 and CIS may support military operations.

Organization

NIMA

The Director, NIMA, coordinates national CIS support to military and intelligence agencies. NIMA established CIS interoperability standards and data formats for all IMINT operations. Military forces and intelligence agencies use these standards and data formats to support interoperable planning and direction, collection, production and dissemination of IMINT.

A NIMA Customer Support Response Team (CSRT) may be integrated into a NIST or may be deployed in direct support of a military force. The CSRT will typically contain a deployable imagery/geospatial server known as the Quick Response System (QRS). The QRS is self-contained and generally requires only satellite communications (SATCOM) channel access support from the JTF or other supported unit. The JTF J-2 coordinates SATCOM channel and COMSEC support through the JTF J-6. Additionally, depending upon the situation, other CIS and related support that a NIST may require from the supported unit includes information systems technical support and an access controlled secure area (generally within the supported unit's tactical sensitive compartmented information facility [TSCIF]).

During operations, the CSRT QRS provides a MAGTF with a wide range of imagery and geospatial information and services support. In support of garrison operations, a NIMA CSRT provides special training and exercise support to MAGTFs. Also, NIMA may provide MAGTFs temporary

specialized equipment to meet unique operational needs or to satisfy critical deficiencies.

NRO

The NRO has theater-focused customer support teams to provide direct operational support to MAGTFs and other forces. These teams include on-site military/contractor personnel collocated with the combatant and other commands. Basic support includes education on NRO systems and capabilities, training on tasking, receiving, processing, and analyzing data collected by NRO systems. Equipment and personnel are available to support MAGTF operations during contingencies. NRO support elements are usually self-sufficient, requiring no MAGTF CIS operational support beyond routine communications coordination.

National Intelligence Support Team

All-source national intelligence level IMINT and other intelligence assets may deploy in support of JTF (and even directly in support of MAGTF) operations as well as providing critical support via reach back and collaborative capabilities. The NIST is the most typical method used. The NIST is a task-organized unit generally consisting of DIA, NSA, CIA, and, as appropriate, NIMA personnel and equipment. Its mission is to provide a tailored, national level all-source intelligence team to deployed commanders (generally at the JTF headquarters level, but support could be provided to other commands) during crisis or contingency operations. Depending upon the supported unit's requirements, a NIST can be task-organized to provide coordination with national intelligence agencies, analytical expertise, I&W, special assessments, targeting support, streamlined and rapid access to national intelligence data bases and other products, and assistance facilitating request for intelligence (RFI) management (see figure 4-1).

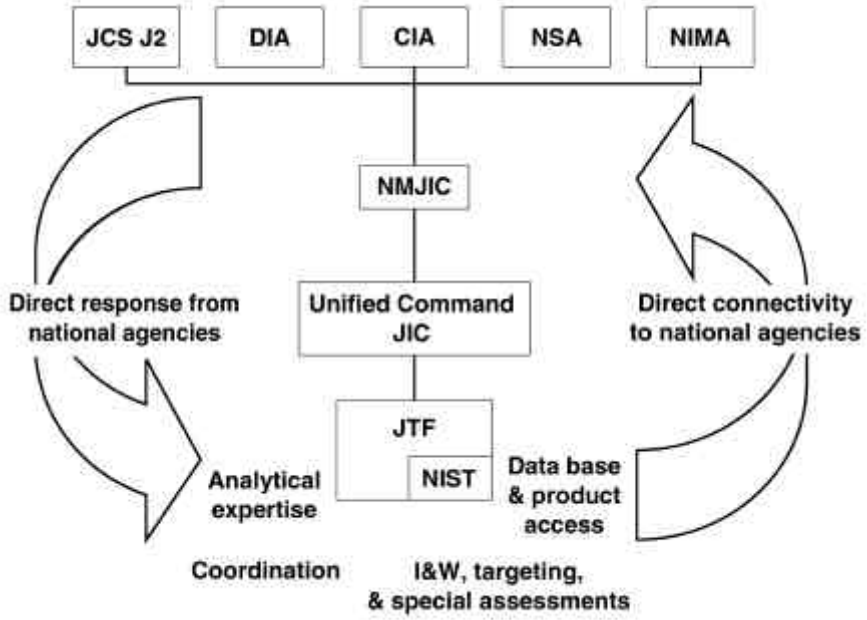


Figure 4-1. NIST Capabilities.

DIA, through the joint staff J-2, controls the NIST for deployment and administrative purposes (see figure 4-2 for an overview of a NIST's deployment cycle). During operations a NIST will usually be in direct support of the JFC, who exercises C2 of it via the JTF J-2. Once deployed, the intelligence agencies with representatives on the NIST provide leadership. The basic C2 relationships between the NIST and the JTF (or other supported commands) command relationship are direct support. The NIST will be under the staff cognizance of the JTF J-2, performing intelligence support functions as so designated. The basic NIST concept of operations is to take the J-2's RFIs and collection and production requirements, discuss and deconflict these internally within the NIST to determine which element(s) should take these for action. Each NIST element leader, and as coordinated by the NIST team chief, will conduct liaison with their parent national intelligence organization. Intelligence generated by the NIST is available to the JTF J-2 JISE, the JFC, and other elements of the JTF with the usual restriction based on clearance and programs.

The composition and capabilities of each NIST deployment is unique based on the mission, duration, agencies representation, and capabilities required (see figure 4-3). A NIST, however, is not a totally self-contained element. It requires logistic and other support from the supported command. Depending upon the situation, support that a NIST requires from the supported unit includes information systems technical support and an access controlled secure area (generally within the supported unit's TSCIF).

A NIST's organic capabilities generally encompass only intelligence and some unique CIS support. NIST CIS capabilities will be task-organized. A NIST may range from a single agency element's voice connectivity to a fully equipped NIST with JISE and JWICS video teleconferencing (VTC)

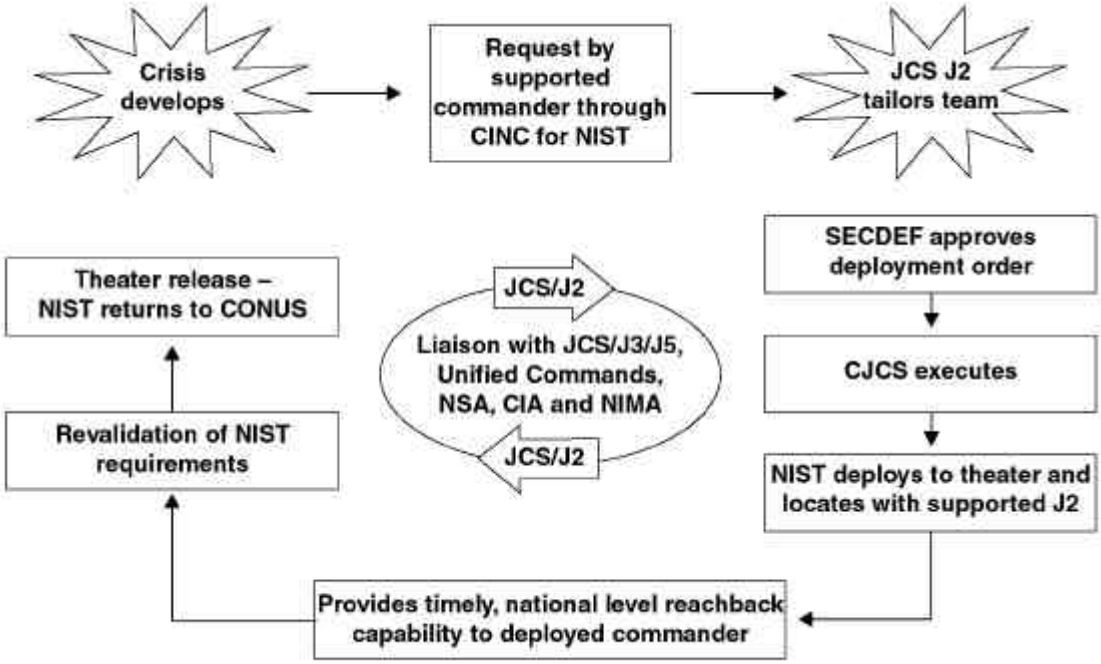


Figure 4-2. NIST Deployment Cycle.

CIA	DIA	
Four personnel (two analysts, two communicators) Associated comms and info systems workstations	Four personnel (three analysts, one systems technician) Associated comms and info systems workstations	**A NIST is task-organized to fulfill the supported commander's intelligence requirements**
NSA	**NIMA**	
Five to twelve personnel (Analysts, Systems Technicians, and Communicators) Associated comms and info systems workstations	Two personnel (one Imagery Analyst, one Geospatial Analyst) Associated info systems workstations	

Figure 4-3. Notional Composition of a Nist.

capabilities (see figure 4-4 for one of a NIST's key sophisticated CIS capabilities). Current methods of operation continue to rely on both agency and supported command-provided communications paths to support deployed NIST elements. The systems that each element is capable of deploying are discussed in greater detail in JP 2-02, *National Intelligence Support to Joint Operations*, appendix C.

Theater

Combatant Commands' Joint Intelligence/Analysis Centers (JIC/JAC). The combatant commands' JICs and JAC are the cornerstones for fulfilling the IRs of the geographic combatant commanders and their subordinate commanders. The JICs and JAC are the primary sources from which

Figure 4-4. NIST JWICS Mobile Integrated Communications System.

subordinate JTFs receive intelligence support for their areas of interest, providing finished intelligence products supporting theater mission planning and execution.

Collection. The combatant commander's J-2 retains full collection management authority (i.e., to validate, modify, or non-concur) over all intelligence collection requirements against targets within their area of responsibility. Such authority may be delegated to a subordinate JFC. Validated collection requirements, to include imagery collection, that cannot be satisfied by organic JTF means will be submitted to the combatant command's JIC/JAC.

Processing and Exploitation. The JIC/JAC processes and exploits imagery in theater. Downlinked imagery data signals may be transmitted to work-stations for either immediate exploitation, stored on tape, sent to digital archives for later use, or laid out on film for exploitation.

Production. Combatant commands, services, and defense agency intelligence production centers' production responsibilities are clearly delineated within the DOD Intelligence Production Program (DODIPP). The DODIPP is structured to capitalize on the analytical and production resources of the entire DOD intelligence production community. It supports the efficient use of production resources, prevents duplication of effort, and enhances timely support to user IRs. The Community On-Line Intelligence System for End-Users and Managers (COLISEUM) automates DODIPP procedures for stating and tracking theater IRs and other intelligence production requirements. Results from imagery exploitation and the annotated images may be incorporated into all-source intelligence products, stand-alone IMINT products or into various IMINT and intelligence data bases.

Dissemination. The JDISS, which mainly uses JWICS for connectivity, is the primary intelligence system used by the JIC/JACs for both the receipt and dissemination of imagery and other intelligence products. Using these systems, multimedia intelligence dissemination (e.g., voice, data, imagery, record message, e-mail, graphics, and video) can be supported. Internally, the JIC/JACs use the Imagery Data Exploitation System (IDEX) for manipulation and exploitation of imagery, with JDISS and JWICS used for secondary imagery and other intelligence dissemination. File servers maintained by the JIC/JACs are key components of intelligence support. For imagery, the current capability is provided by the demand driven direct digital dissemination (5D) server, with NIMA's IPL planned as its replacement. These file servers can be accessed using JDISS providing subordinate commands and other users the ability to pull imagery and other intelligence when required. The JICs have access to all of the government-owned, common user networks used by the intelligence community: Automated Digital Network/Defense Message System, (AUTODIN/DMS), Defense Special Security Communications System (DSSCS), NIPRNET, SIPRNET, JWICS, and the Defense Switched Network (DSN). Access to military satellite systems includes the Defense Satellite Communications Systems (DSCS) and the Fleet Satellite Communications System. Commercial satellite access is also available through the International Maritime Satellite System and INTELSAT.

JTF J-2 and the Joint Intelligence Support Element

The JTF J-2 organizational structure and capabilities will be situation and mission dependent as determined by the JFC and the JTF J-2. The JISE is the principal intelligence C2 node within the JTF J-2. The JISE is the focus for JTF intelligence operations, providing the JFC and component commanders with situational awareness and other intelligence support regarding adversary air, space, ground and maritime capabilities and activities.

A NIST provided in support of the JTF headquarters will integrate its operations within the JISE. Key JISE functions and capabilities include collection management support, OOB analysis, identification of threat centers of gravity and critical vulnerabilities, and intelligence support to targeting and force protection.

All IMINT collection, production, and dissemination activities will be conducted within the JISE. Once initial basic and current imagery and IMINT products and support have been provided to the JTF and its components, updates will be accomplished by the JISE using push/pull dissemination techniques. Intelligence CIS based on the JDISS/JWICS functionality provide the JTF with the ability to query theater and national IMINT servers and data bases for the most current intelligence.

Collection

The JTF J-2 collection manager will plan, coordinate, and use direct imagery collection operations in support of the JTF. As shown in figure 4-5, theater

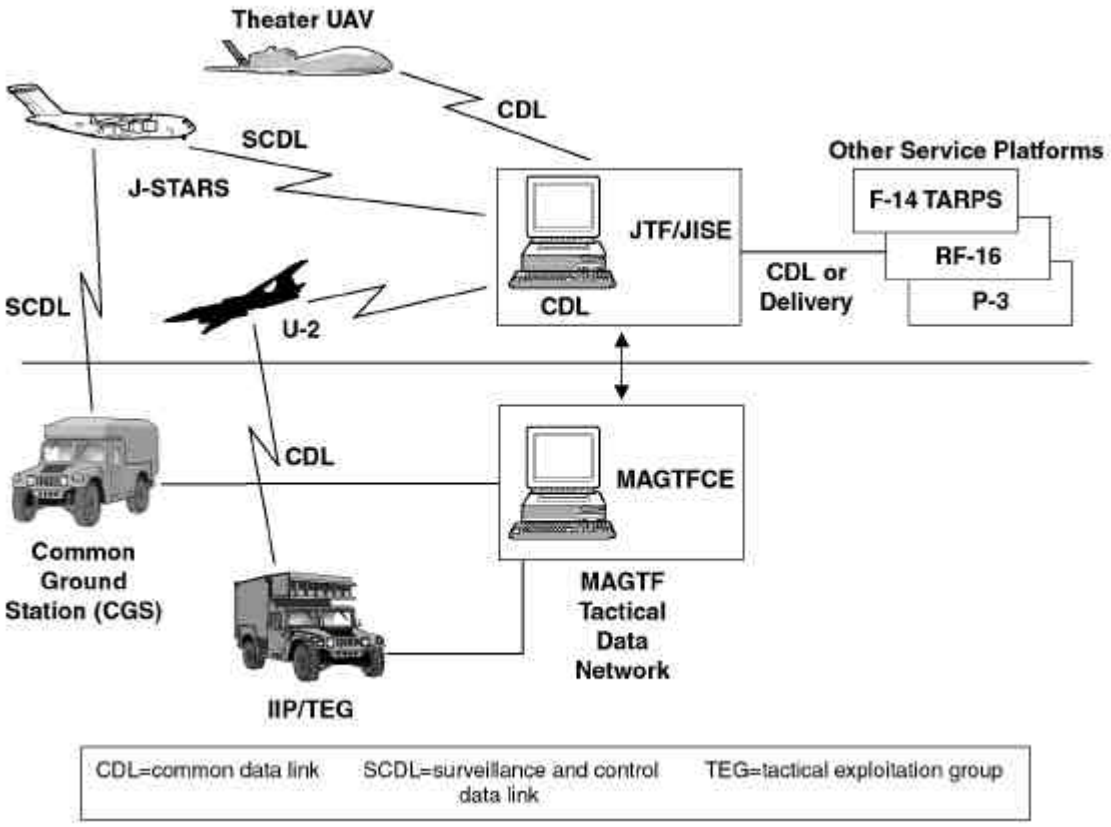


Figure 4-5. Theater/JTF Imagery Collection.

and JTF imagery collection assets include the U-2, J-STARS, theater UAVs, and other-Service assets such as the Navy's F-14/TARPS and the Air Force's RF-16. MAGTF interfaces with these collection assets are depicted by the lines in figure 4-5. Communication support planning provides connectivity from these major nodes into the TEG and MAGTF TDN.

Production

IMINT production requirements are managed by the JISE in accordance with the JFC's PIRs and other validated IRs.

Dissemination

Once basic and current intelligence and imagery have been provided to a deploying JTF and its components, updates will be accomplished using push/pull dissemination techniques. Intelligence CIS based on the JDISS/ JWICS functions provide the JTF with the ability to query theater and national IMINT servers and data bases for the most current intelligence.

Naval Forces

MAGTFs, when afloat, use the Navy's imagery dissemination backbone, such as Challenge Athena and JSIPS-Naval, and continue to receive imagery support from the Navy once ashore, via doctrinal communications.

Amphibious Task Force Intelligence Center

During amphibious operations, the ATF and the MAGTF CE's intelligence sections will generally integrate their operations. The principal intelligence C2 node is the ATFIC located aboard the ATF flagship. The ATFIC is composed of designated shipboard spaces with installed CIS systems that support the intelligence operations of the ATF and LF while reducing duplicative functions and producing more comprehensive and timely intelligence for the naval task force. Standard CIS connectivity is available (JWICS, SIPRNET, NIPRNET, AUTODIN, DSN). Access is provided via the flagship's GENSER communication center and the special intelligence communications center within the ATFIC's ship's signals exploitation space.

CVBGs/TARPs Squadrons

TARPS support to MAGTF operations requires no unique CIS support. Most often, TARPS imagery is delivered to the ATFIC via courier. Processed TARPS imagery may be digitized and disseminated to the ATF and LF via JDISS, JWICS, or the joint maritime communications information system.

MEF Command Element

Combat Intelligence Center

The CIC and its subordinate elements are the principal MAGTF intelligence C2 node providing the facilities and infrastructure for the centralized direction for the MEF's comprehensive intelligence, CI, and reconnaissance operations. Since the CIC must effectively support the entire MEF, it must remain responsive to the requirements of all elements of the MAGTF.

Table 4-1. MEF CE CIC and Intel Bn's IOC Key Elements.

Element	Responsibilities
G-2 Plans	Serves as the G-2 section's main element for coordinating and providing intelligence support to the MEF CE future plans team and leadership and direction of the G-2 section's imagery and mapping, SIGINT, and weather sections.
G-2 Operations	Serves as the G-2 section's main element for coordinating and providing intelligence support to the MEF CE CG, battle staff, and current operations center elements; target intelligence support to the force fires and future operations; G-2 section intelligence requirements management activities; red cell support; and MEF intelligence liaison with external commands and organizations.
IOC	Serves as the principal MEF intelligence operations and C2 center that is established by intel bn; performs intelligence requirements management, staff cognizance of ongoing organic and supporting collection operations, intelligence analysis and production, and intelligence dissemination.
ı Support Cell	Serves as primary element for conducting MEF-wide intelligence requirements management, weather support, collections and dissemination planning and direction, and intelligence staff cognizance of MEF organic and supporting intelligence and reconnaissance operations.
ı P&A Cell	Serves as the primary analysis and production element of the MEF; processes and produces all-source intelligence products in response to requirements of the MEF; serves as the principal IMINT and GEOINT production element of the MEF.
ı SARC	Serves as the primary element for the supervision of MEF collection operations; directs, coordinates, and monitors intelligence collection operations conducted by organic, attached, and direct support collection assets.
CI/HUMINT Company Command Post	Serves as the primary element for conducting CI/HUMINT planning and direction, C2, and coordination of MEF CI/HUMINT operations with external CI/HUMINT organizations.
Operations Control and Analysis Center	Serves as the main node for the C2 of radio battalion SIGINT operations and the overall coordination of MEF SIGINT operations; processes, analyzes, produces, and disseminates SIGINT-derived information; and directs the ground-based electronic warfare activities of the radio battalion.
Reconnaissance Operations Center	Serves as the main node for the C2 of force reconnaissance company's operations and the overall coordination of MEF ground reconnaissance operations; processes, analyzes, produces, and disseminates ground reconnaissance-derived information in support of MEF intelligence requirements.

Supporting this objective, the CIC integrates and supports both MEF G-2 section and intelligence battalion operations. While integrated, the organizational approach differs for each of these. The CIC is the overarching intelligence operations center established within the MEF main command post. It encompasses the primary functions of the MEF intelligence section and intel bn. The CIC includes the sub-elements listed in table 4-1.

G-2 Section

The key G-2 nodes are organized to effectively align and support the MEF CE's staff cross-functional cellular staff organization (see figure 4-6) and

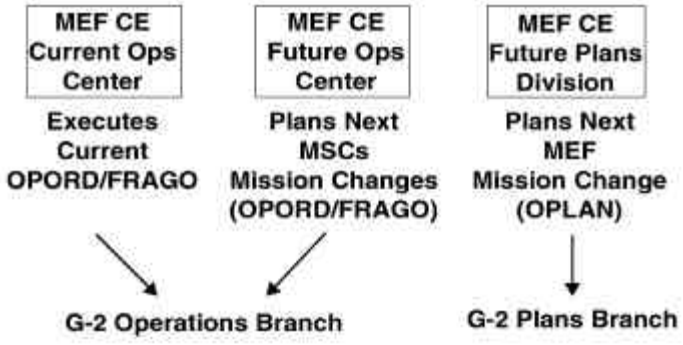


Figure 4-6. MEF CE Cross-Functional Cellular Organization and Intelligence Support.

concept of operations. The G-2 plans branch provides intelligence support to the MEF CE's future plans cell efforts. The G-2 operations branch provides intelligence support to the MEF CE's COC, FOC, force fires center and directs and manages the G-2's red cell and the MEF's external intelligence liaison teams.

CIC facilities, CIS, and other support must allow the AC/S G-2 and G-2 section to perform the following major tasks:

- Developing and answering outstanding MEF and subordinate units' PIRs and IRs by planning, directing, integrating, and supervising MEF organic and supporting intelligence, CI and reconnaissance operations.
- Planning the MEF concept of intelligence operations for approval by the AC/S G-2 and subsequent implementation by the ISC based upon the mission, threat, commander's intent, guidance, and concept of operations.
- Recommending CI and force protection measures and countermeasures.
- Preparing appropriate intelligence plans and orders for the MEF, to include reviewing, coordinating, and integrating the intelligence plans of JTFs, theaters, and other organizations.
- Coordinating, providing, and facilitating the use of intelligence to the MEF CG, the battlestaff, the future plans cells, the FOC, the COC, and the force fires center.
- Planning, directing, and supervising MEF liaison teams to external commands (e.g., the JTF and joint functional components headquarters) and intelligence organizations.
- Coordinating and supervising the transition of intelligence planning and operations from G-2 plans to G-2 future operations, and from G-2 future operations to G-2 current operations, to effectively support the MEF's single battle transition process.

Intelligence Operations Center

The IOC is the other principal MEF CE intelligence node. The key subordinate elements within the IOC and their typical composition are the support cell, the SARC, and the P&A cell (see figure 4-7). It provides the

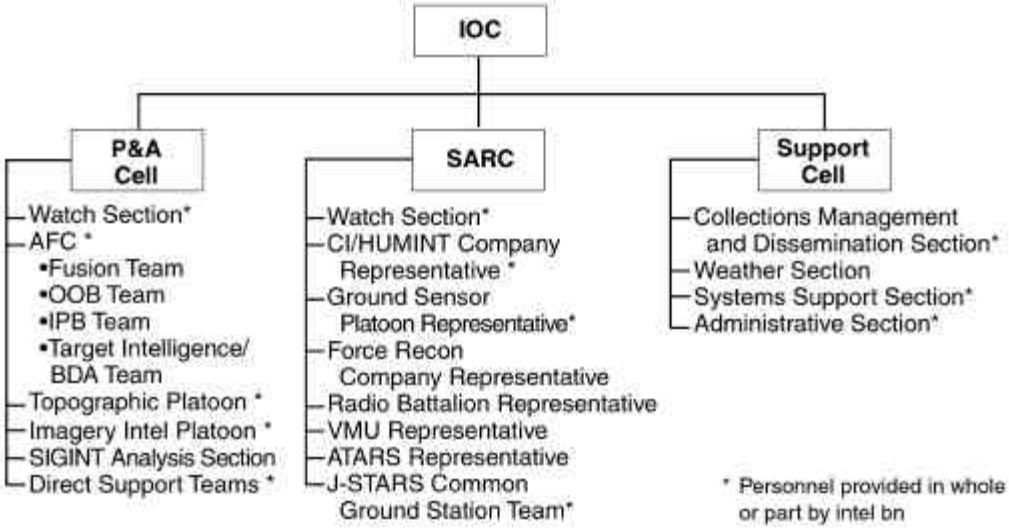


Figure 4-7. Intelligence Operations Center Elements and Composition.

facilities, CIS and other support to allow the ISC and intel bn to perform the following tasks:

- Provide centralized direction for MEF intelligence operations under the staff cognizance of the AC/S G-2. The IOC is the core for this task, with key assistance from the G-2 plans and G-2 operations elements.
- Consistent with the commander's priorities, consolidate, validate, and prioritize IRs of the entire force. The key element providing this is the CMD section within the IOC's support cell. Intelligence specialists from all disciplines, to include IMINT, generally are organic to this section.
- Plan, develop, and direct the MEF collection, production, and dissemination plans and operations. The key elements providing for this are the CMD section within the IOC's support cell and the P&A cell.
- Submit consolidated requests for external intelligence support through the Marine component headquarters to appropriate agencies. The key element providing this is the CMD section within the IOC's support cell, assisted by the P&A cell and the G-2 operations branch.
- Allow the ISC to exercise, per AC/S G-2 cognizance, principal staff cognizance of MEF organic and supporting intelligence, CI and reconnaissance operations, to include SIGINT, IMINT, HUMINT, GEOINT, CI, measurement and signature intelligence (MASINT), ground reconnaissance, and aerial reconnaissance operations.
- Coordinate and manage the employment of MEF organic collection assets through the IOC's SARC. Within the SARC will be representatives from most organic and supporting intelligence and reconnaissance units to provide C2 and reporting of ongoing intelligence operations.
- Maintain a consolidated, all-source intelligence production center in the MEF in IOC's P&A cell. The other node with significant intelligence production involvement is the radio battalion's OCAC. Similar to the CMD section, intelligence specialists from all intelligence disciplines generally are organic to the P&A cell.
- Link the MEF CE to national, theater, joint, other-Service, and multinational intelligence assets and operations. All intel bn and G-2 section nodes have common and unique capabilities to perform critical tasks within the function. In addition to MEF CE common communications pathways provided by the communications battalion, the IOC generally will also have unique intelligence communications capability, such as TS II.

CIS Support

CIS support to CIC and IOC operations vary from operation to operation based upon METT-T. Generally all nodes will have access to IAS and JDISS (each with COLISEUM and other specialized applications) and connectivity with the full range of communications (JWICS, SIPRNET, NIPRNET, DSN, defense message system, voice, video-teleconferencing, etc.) via either MEF CE common communications or unique intel bn CIS capabilities. Examples of unique intelligence CIS capabilities are those integral to the VMU squadron RRS, the radio battalion technical control and analysis center and the AN/MSC-63A special security communications central, the ground sensor platoon's tactical remote sensor system, the IIP's TEG, the Marine tactical electronic warfare squadron's tactical electronic reconnaissance processing and evaluation system, the CI/HUMINT automated tool set,

Manpack SIDS, TS-II, and the J-STARS CGS. See figure 4-8 for a notional depiction of an overarching MEF intelligence CIS architecture.

Overall MEF Intelligence C2 Relationships

The MEF G-2 section and intel bn's overall C2 relationships and resulting all-source intelligence support flow throughout the MEF are indicated in figure 4-9.

CIC/IOC Operations and IMINT

IMINT activities will be integral to many CIC/IOC operations. Key activities include:

Collection. The CMD section, headquarters, intel bn, provides the core for MEF CIC collection operations. During operations the CMD section is

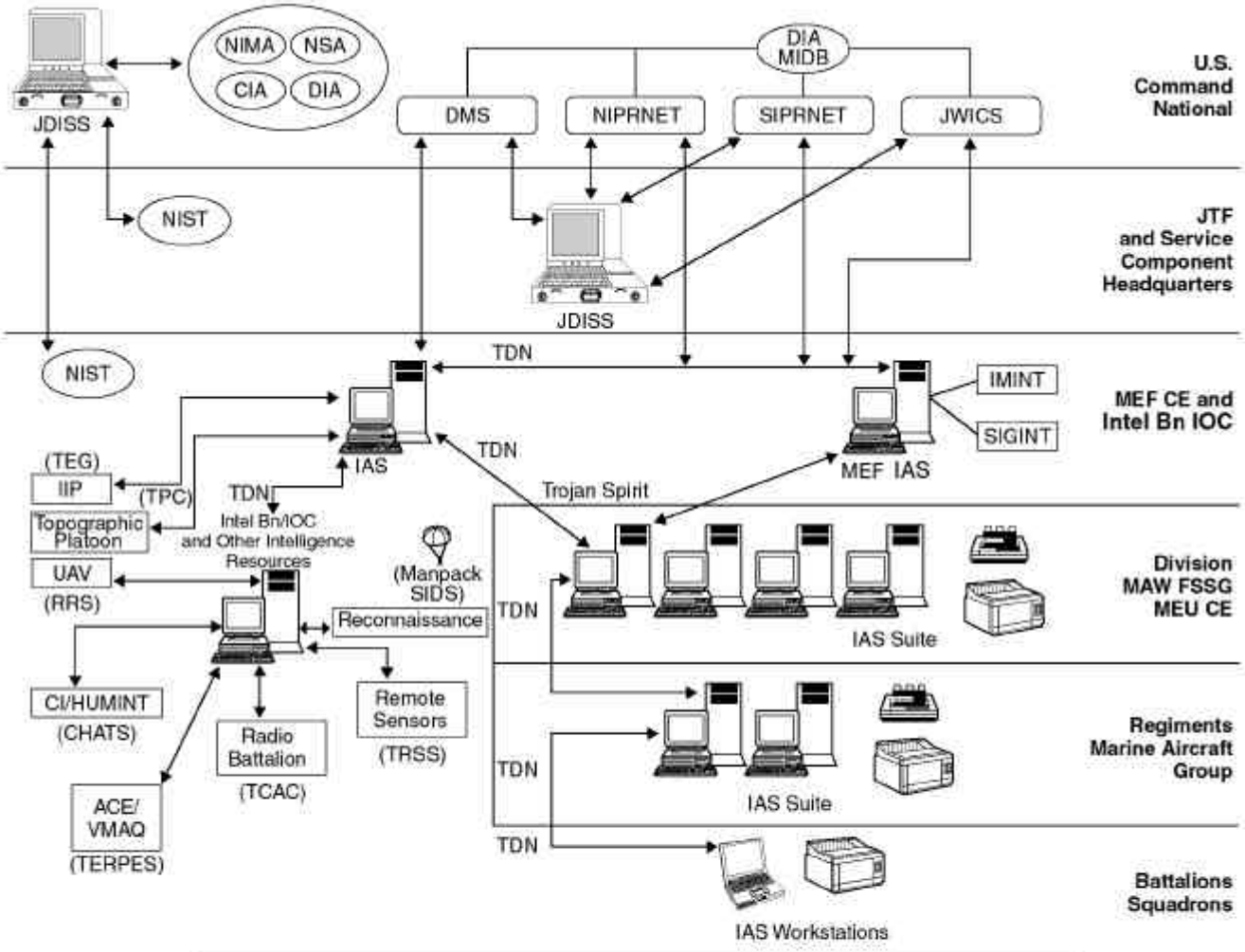


Figure 4-8. Notional MEF Intelligence Communications and Information Systems Architecture.

located within the IOC's support cell. Intelligence specialists from all disciplines, to include IMINT, are organic to this section. Key CIS resources required included IAS (with COLISEUM and other specialized applications) and access to the full range of communications: JWICS, SIPRNET, NIPRNET, and DSN, etc.

The SARC, another key element within the IOC, provides the other key component of collection operations. Within the SARC will be representatives from most organic and supporting intelligence and reconnaissance units to provide C2 and reporting of ongoing intelligence operations. Regarding IMINT, these representatives will include a UAV squadron element with supporting CIS resources to monitor ongoing UAV operations and report time-sensitive intelligence.

Production. The P&A cell, intel bn, provides the core for MEF intelligence production operations. Similar to collection, intelligence specialists from all intelligence disciplines are organic to the P&A cell. Key CIS resources required included IAS and JDISS, with access to the full range of communications (JWICS, SIPRNET, NIPRNET, DSN, etc.). The IIP, intel bn, and MCISU detachment (if available) generally will be integrated into P&A cell operations to efficiently support both IMINT and all-source production operations.

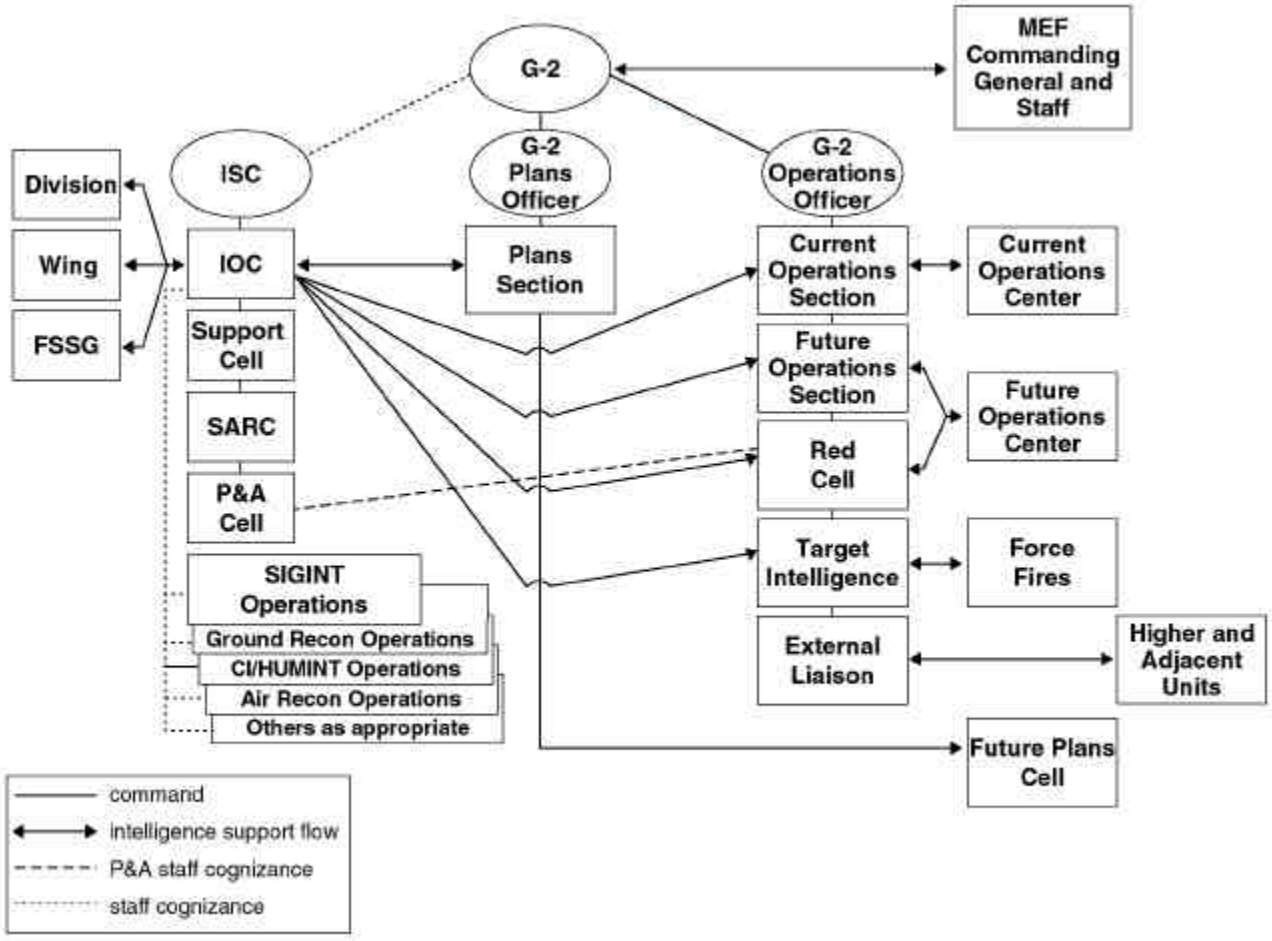


Figure 4-9. MEF Intelligence C2 Relationships and Intelligence Support Flow.

Dissemination. The CMD section, headquarters, intel bn, provides the core C2 for MEF intelligence dissemination operations. Key CIS resources required included IAS and JDISS, with access to the full range of communications (JWICS, SIPRNET, NIPRNET, DSN, etc.) for external dissemination; and IAS via the TDN and other MEF communications resources for internal dissemination.

The MEF CE will exploit all of the external capabilities discussed earlier to satisfy its IRs, with heavy reliance on the MCISU for national imagery support and the JIC/JAC for theater and national support. National imagery and related products are received over dedicated terrestrial links that terminate at the MCISU's JSIPS National Dissemination Element (DE); standard communications connectivity from the deployed MEF to the MCISU via the DISN are normally provided by satellite communications. Currently, these links are predominantly super high frequency (X-Band) military SATCOM using GMF terminals. In the future, more C-Band and Ku-Band commercial SATCOM will be employed, using mobile Tri-Band SATCOM terminals. The limited capacity of these links to DISN remains a significant choke point for deployed MAGTFs. Efficient use of these links is critical to higher effective traffic throughput.

In addition to the MAGTF TDN and other common user communications capabilities, certain imagery units have specialized capabilities to support IMINT dissemination. The UAV squadron's RRS, attached to MEF MSEs (e.g., the MEF main effort), provides direct, time-sensitive UAV support.

Within the MEF, the IAS is the principal information system resource to support secondary imagery and other IMINT product dissemination. IAS will be available at all command echelons down to the maneuver battalion/ squadron levels.

Communications connectivity between the MEF CE and its MSE headquarters are predominantly provided by SATCOM, supplemented where practical with terrestrial line-of-sight and troposcatter multi-channel radio systems. Connectivity to the regiment/group level is principally via the TDN (with current capabilities of between 16 and 32 kilobytes per second [kbps]) and various multichannel radio resources. Finally, communications connectivity below the regiment/group command echelon depends principally on single channel radio primarily designed for voice traffic, with limited range and limited data capacities (1.2 kbps to 16 kbps). Although these units possess tactical data systems, their ability to exchange data traffic is currently limited due to the far less available bandwidth connectivity with the MAGTF TDN.

4003. IMAGERY INTELLIGENCE INFORMATION SYSTEMS AND SUPPORTING COMMUNICATIONS

Imagery Direction and Collection Management

IAS and the Requirements Management System (RMS) are the key automated information systems resources supporting MAGTF IMINT operations (see figure 4-10).

Intelligence Analysis System

IAS is the principal intelligence information system tool. IAS automates MAGTF intelligence activities of direction, collection, processing, production, and dissemination of critical tactical intelligence from embedded data bases and multiple sources. It is interoperable with JDISS

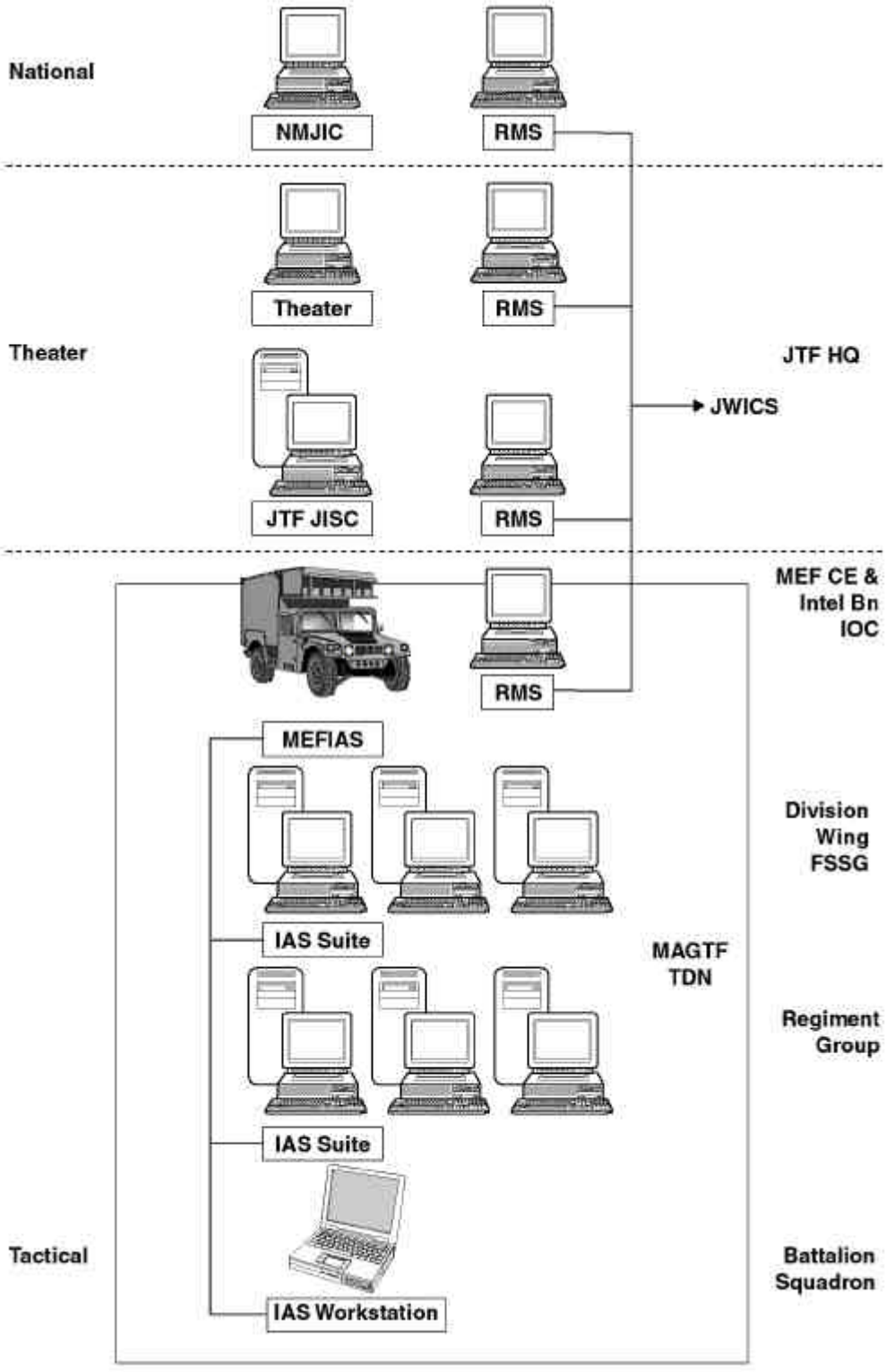


Figure 4-10. Imagery Direction and Collection Management.

and a wide range of other intelligence and reconnaissance systems. This allows for better identification and tracking of MAGTF IRs, and development and C2 of supporting collection, production and dissemination activities, both within the MAGTF as well as with other services, JTF, theater, and national intelligence operations. Various configurations of IAS are fielded from the MEF CE through battalion and squadron command echelons. IAS contains a limited automated collection management tool for imagery, as well as for other organic intelligence collection.

Basic System. IAS is capable of communication and data exchange at both the GENSER and SCI levels via the MAGTF TDN. Composition and size will vary at each echelon, but the IAS essentially consists of data storage devices, workstations, and input/output devices. Workstations at all echelons will share common software applications.

Configuration. IAS consists of three configurations (see figure 4-11): MEF IAS, IAS suite, and the IAS workstation. The MEF IAS consists of two shelters mounted on HMMWVs and is used at the MEF CE level. The IAS suite consists of team portable equipment and will be used in the MEU(SOC) CE and at division, MAW, regiment, and MAG headquarters. Finally, the IAS workstation consists of a single computer workstation and will be organic to battalion and squadron intelligence sections.

Features. The IAS provides connectivity and interoperability with most MAGTF intelligence, reconnaissance and other C2 systems, and with other services, JTF, theater and national intelligence organizations and data bases. IAS features improve the intelligence functions at all echelons of the MAGTF by providing a semi-automated all-source intelligence fusion center. It is capable of rapid access to and dissemination of critical, perishable tactical intelligence concerning terrain, weather, and enemy situation at all command levels. The IAS incorporates the capability to

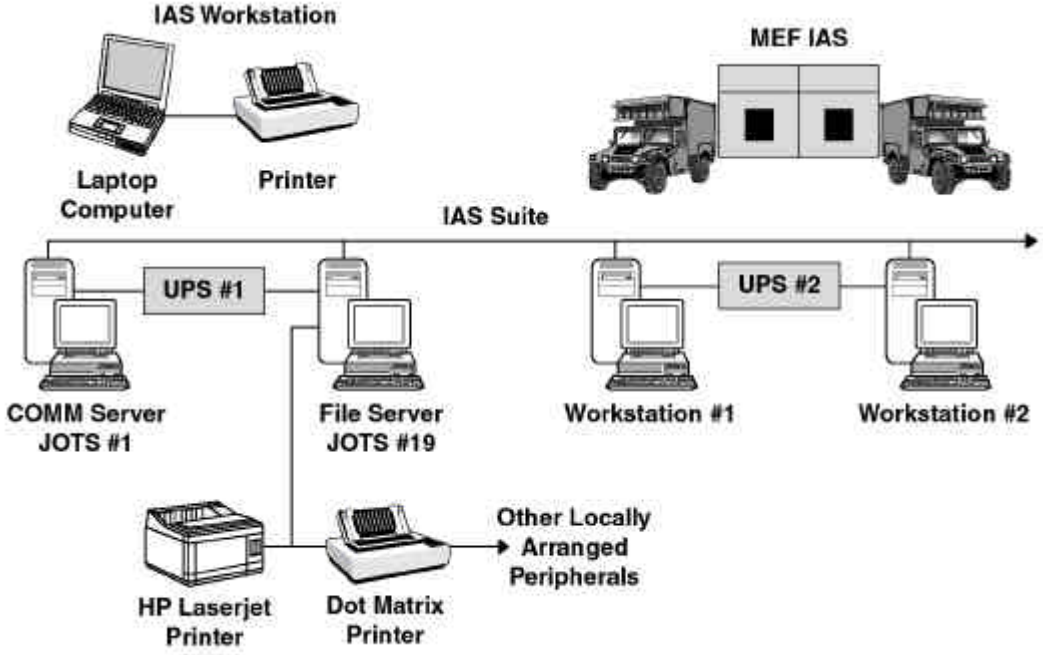


Figure 4-11. Intelligence Analysis System.

disseminate imagery throughout the MAGTF via SIDS. It facilitates display, processing, analysis, preparation of intelligence products, and dissemination of intelligence products.

Requirements Management System

RMS provides the MAGTF and other users with a comprehensive national imagery collection management capability. RMS allows MEF collection managers to access the national imagery requirements tasking and tracking system (RMS terminals are also located at the MARFOR headquarters, MCIA Suitland and with the Marine Corps DRO). RMS users generate imagery requirements nominations interactively via networked RMS or RMS-supported workstations. The nominations are automatically transferred to the appropriate review authority, and upon validation and prioritization, taskings are transmitted by RMS to the collection, exploitation, production, and dissemination organizations.

System Configuration. RMS is an SCI-high system. The major components include a file server, tape library system, access server for remote troubleshooting, a network laser printer, and the workstation itself.

RMS Connectivity. RMS communications connectivity requirements include JWICS and defense special security communications system (DSSCS).

Imagery Collection

The Marine Corps relies on both organic (see figure 4-12) and external

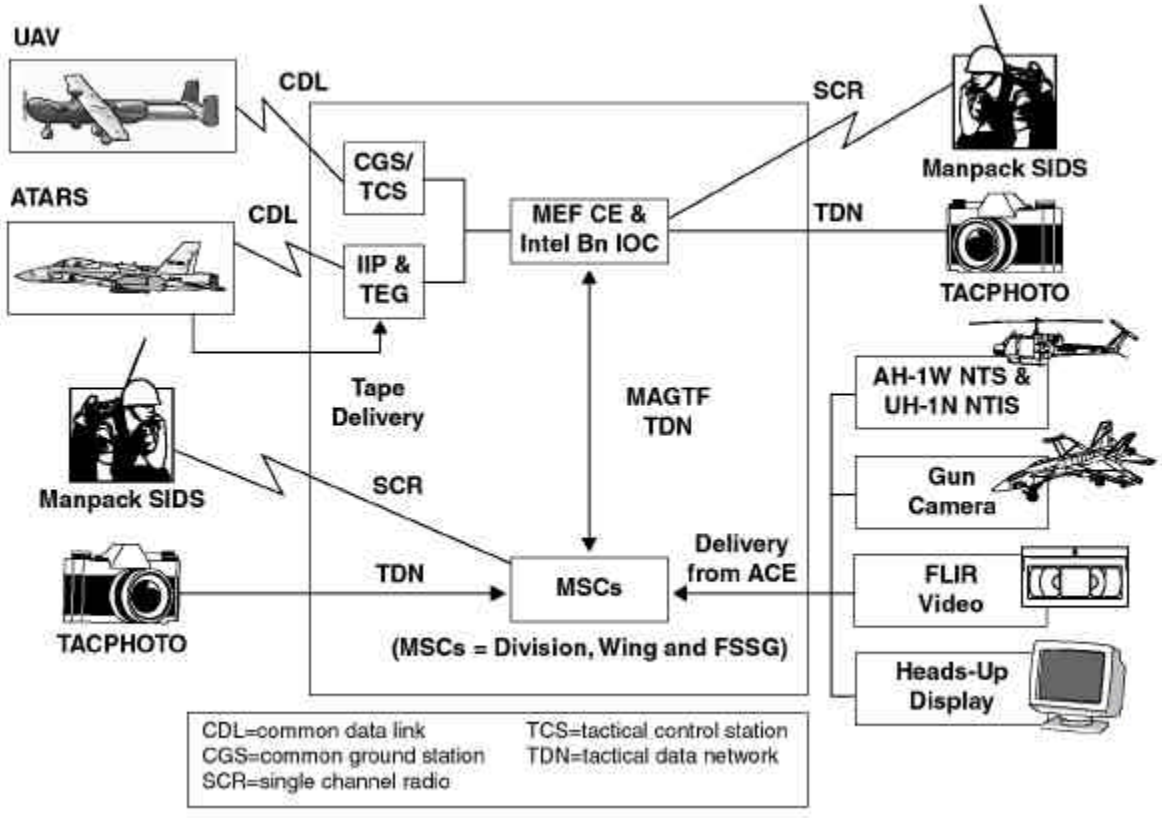


Figure 4-12. MEF Organic Imagery Collection.

collection assets for its imagery. The following paragraphs present MAGTF organic imagery collection assets and key C2-related information.

Advanced Tactical Airborne Reconnaissance System

The ATARS suites reside with the F/A-18D squadrons. ATARS-equipped F/A-18D aircraft will provide the MAGTF with organic manned aerial imagery reconnaissance capability in support of IMINT operations. ATARS is capable of infrared, EO, and radar imagery collection, and provides high resolution, day and night imagery support in all weather conditions, through both overflight and long-range standoff. The F/A-18D's long-range standoff capability is made possible with the installation of an upgraded, all-weather SAR system. Imagery is recorded and data-linked via integration with the ATARS sensor suite. The tactical interoperable ground data link (TIGDL) CDL will provide limited near-real time capability for dissemination of data on select critical targets (down linked to the IIP's TEG), with subsequent manual tape download for exploitation of the complete track. Figure 4-13 depicts the F/A-18D systems architecture.

Unmanned Aerial Vehicles

UAVs provide MAGTFs a valuable aerial reconnaissance and imagery (video and infrared) capability. The Pioneer UAV resides in the VMU squadrons. Key UAV CIS resources include:

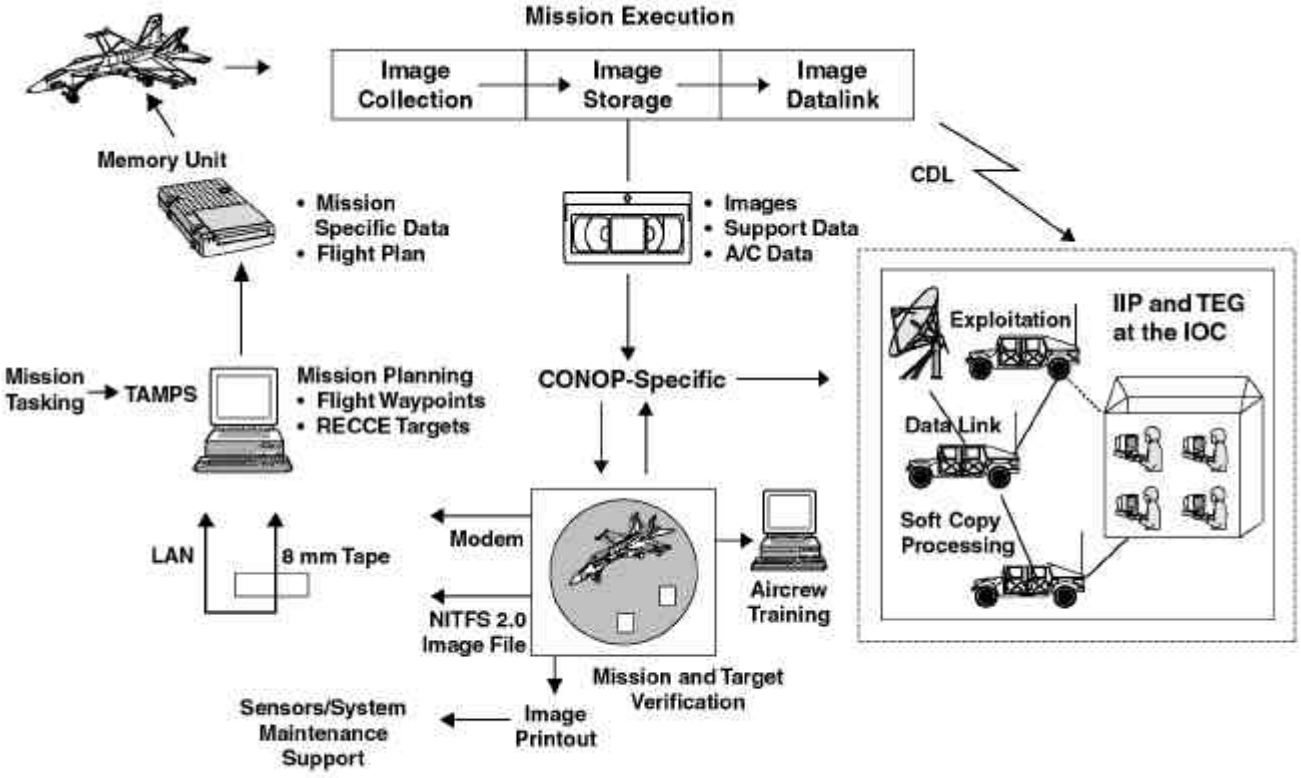


Figure 4-13. ATARS.

Ground Control Station 2000. The GCS-2000 is a small, modular, transportable control station for the UAV system. It controls and monitors the operations of the UAV and the installed payload. Since all pre-flight, takeoff, landing, post-flight, and maintenance procedures and functions can be performed from the GCS-2000, it can be used for controlling the UAV during all mission steps.

Portable Control Station. The portable control station (PCS) system—containing a flight control subsystem, a communications subsystem, and a power supply subsystem—allows UAV launch and recovery from a remote site, afloat or ashore, up to 40 kilometers from the GCS. The PCS allows the external pilot to perform takeoff/landing and flight control until command of the UAV is transferred to the internal pilot in the GCS.

Tracking Control Unit. The TCU controls all UAV tracking and communication functions, manages all up and down link data processing, and performs preflight and system diagnostic tests. The TCU houses all internal communication equipment and antenna subsystems for the GCS and is slaved to it by remoting cables.

Remote Receiving Station. The RRS system is a miniature television receiver that can be attached or placed in direct support of commanders for real-time video pictures, supplemented with voice intelligence reports received from the GCS. There are two RRSs with each UAV system. Directional antennas allow video reception up to 30 kilometers from the UAV.

See appendix E for additional information on UAV squadron communications requirements and operations.

J-STARS Common Ground Station

Overview. The CGS is a mobile, tactical, multisensor ground station that provides the MAGTF CE with communications connectivity with the Air Force's E-8C and the capability to display, process, and disseminate acquired information. The CGS is organic to the intel bn, I MEF and II MEF (these may be tasked to support III MEF, if required). Also receiving and processing MTI, FTI, and SAR data from the E-8C aircraft, the CGS is capable of receiving video data from UAVs, processed SIGINT from the Intelligence Broadcast Network, and secondary imagery from theater and national sources.

Basic System. The CGS is a HMMWV mounted shelter system with component communications, computer, and mobile electric power systems. The CGS can be operated from either fixed positions or while mobile. Its crew of six operators can set up or tear down this system in 30 minutes and can support continuous operations. The CGS features an open-system architecture that enables rapid insertion of the latest government and commercial off-the-shelf technology. The ultrahigh frequency (UHF) SCDL

provides the digital communications connectivity between the E-8C J-STARS airborne element and the MAGTF CE G-2 section's CGS, enabling the transmission of MTI, SAR, and FTI data acquired by J-STARS to support MAGTF target acquisition, situation development, battlespace management, and targeting functions. Figure 4-14 depicts the J-STARS CGS MAGTF systems architecture and concept of operations.

Subsystems. The CGS is comprised of six subsystems: data communications group, sensor interface group, distributed data processing group, peripheral system group, voice communications group, and workstation group. CGS uses high performance CHS-2 SPARC 20 workstations, compatible with the MAGTF TDN.

Collection Capabilities. The E-8C carries a phased-array radar antenna in a 26-foot canoe-shaped radome under the forward part of the fuselage. The radar is capable of providing targeting and battle management data to all J-STARS operators, both in the aircraft and in the CGS module. These operators prepare intelligence reports or help coordinate aircraft, missiles or artillery fire support. With a range in excess of 155 miles, this radar covers an estimated 386,100 square miles in a single 8-hour sortie.

- **Wide Area Surveillance and Moving Target Indicator (WAS/MTI).** WAS/MTI are the radar's fundamental operating modes. WAS/MTI detects, locates and identifies slow-moving targets. Through advanced signal processing, J-STARS can differentiate between wheeled and

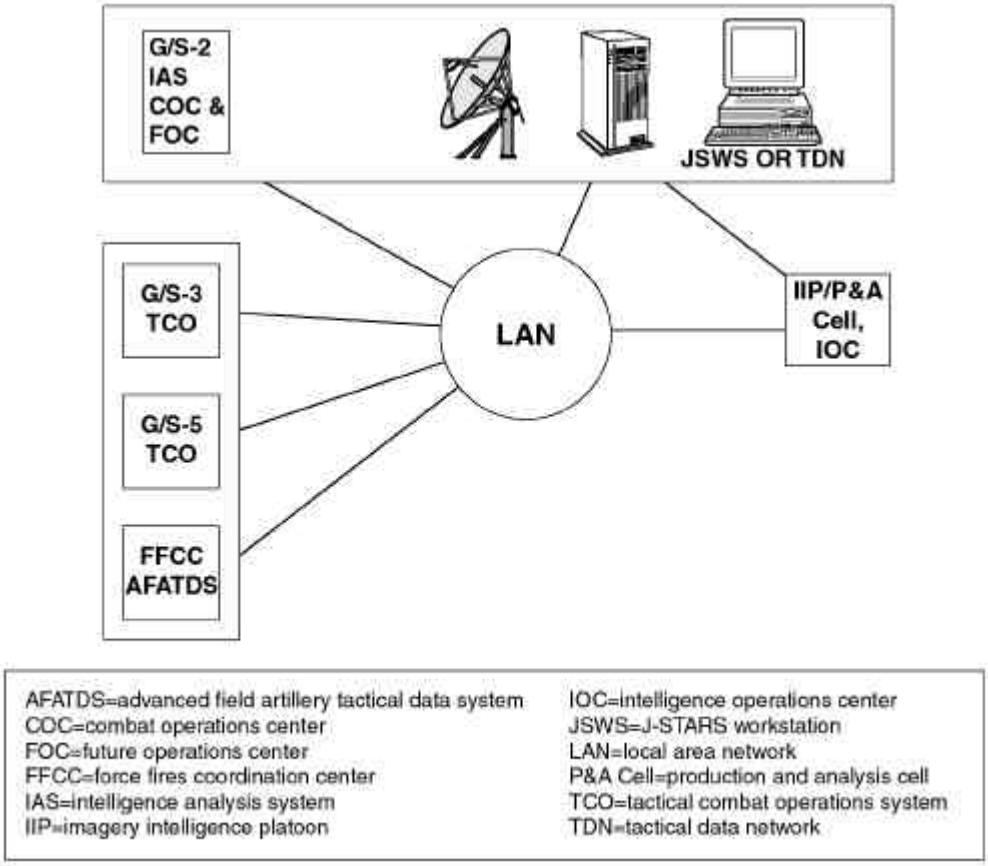


Figure 4-14. J-STARS and MAGTF Operations.

tracked vehicles. By focusing on smaller terrain areas, the radar image can be enhanced for increased resolution display. This high resolution defines moving targets and provides combat units with accurate information for attack planning.

- **Synthetic Aperture Radar/Fixed Target Indicator (SAR/FTI).** SAR/FTI produces a photographic-like image or map of selected geographic regions. SAR data maps contain precise locations of critical non-moving targets such as bridges, harbors, airports, buildings, or stopped vehicles. The FTI display is available while operating in the SAR mode to identify and locate fixed targets within the SAR area. The SAR and FTI capability used in conjunction with MTI and MTI history display allows post-attack assessments made by onboard or ground operators following a weapon attack on hostile targets.

Manpack SIDS

Overview. Manpack SIDS system provides the primary MAGTF capability for hand-held digital imagery reconnaissance (see figure 4-15). Manpack SIDS consists of three digital cameras, three palmtop processors, and a base

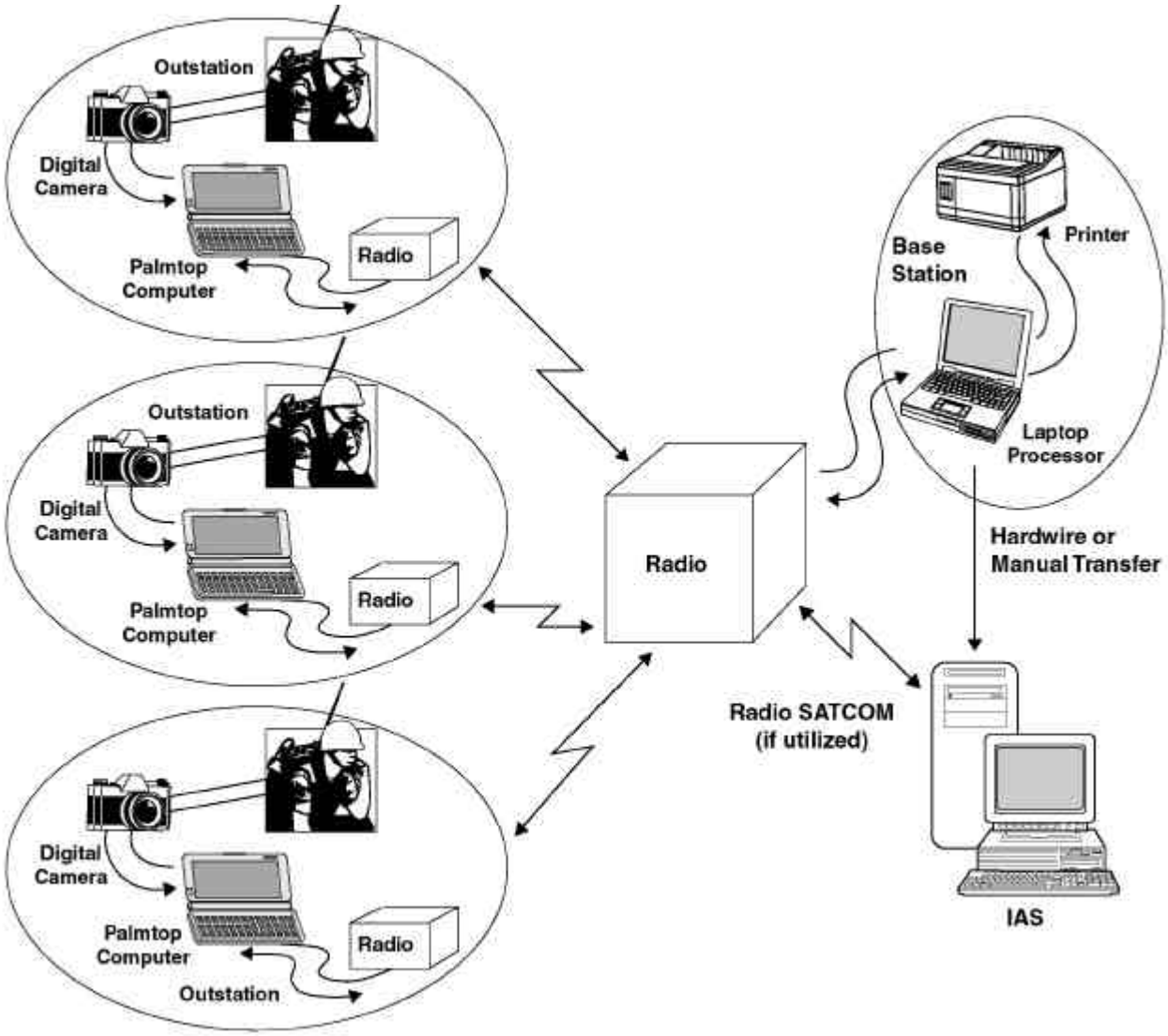


Figure 4-15. Manpack SIDS.

station providing ground reconnaissance units with the capability to take pictures and send the images back to the base station over selected communications paths. The base station then disseminates the images to the supported unit's intelligence section's IAS for follow-on analysis, production, and dissemination via the MAGTF TDN or other CIS resources.

Concept. Manpack SIDS is a tactical hand-held digital imagery collection and dissemination system designed to acquire, store, manipulate, and electronically transmit images derived from ground reconnaissance patrols. The system is comprised of a man-transportable outstation camera with processor and a base station processor with printer. The outstation, with its digital camera component, will be employed by MAGTF ground reconnaissance elements during operations for image acquisition. Imagery collected by the outstation may be stored for subsequent analysis or electronically transmitted to the base station over organic tactical communications for more timely analysis and intelligence production. The base station will be located at the ROC for receipt, manipulation, annotation, and subsequent dissemination of imagery to other intelligence elements or direct to subordinate units in accordance with specified intelligence reporting criteria.

Components and Connectivity. Manpack SIDS consists of three manportable outstations and one base station. The outstation's primary components are a digital camera with three lenses and a palm top computer. In addition, there is one night vision device per system used with the camera in low light situations. The outstation also comes with cables that attach the camera to the palm top, and the palm top to the encryption device and radio. The base station is primarily made up from the lap top computer and thermal printer. It also comes with the cables required to connect with the encryption device and radio (it is interoperable with the PRC-104, PRC-113, single-channel ground and airborne radio system, and various satellite communications resources). The base station is interoperable with the IAS via either the MAGTF TDN or other organic communications.

HML/A's NTS and NTIS

Components

- AH-1W Night Targeting System. The NTS FLIR's linear scanning array consists of 120 mercury cadmium telluride detector elements that scan left to right, then right to left to interlace image. Information is then doubled to provide 480 lines of information. The super videocassette recorder (SVCR) automatically starts recording when the laser designator or weapons firing is activated or through command from the crew, and records in both super very high speed (VHS) and standard VHS formats. Finally, the television tracker is a video autotracker that works with both video and FLIR modes.
- UH-1N Night Thermal Imaging System. The NTIS components are similar to that of the NTS less the NTS's laser designator and television tracker capabilities. Its videocassette recorder (VCR) records only in standard VHS format.

Employment. The NTS and NTIS systems were fielded to provide the MAGTF with all-weather, day/night, autonomous attack, C2 and utility helicopter capabilities. Embedded within each system is a VCR to allow the aircrew to record engagements for debrief, collect BDA information, and to aid in target identification, acquisition, and engagement in a high threat environment while minimizing exposure time. The fielding of these systems greatly expanded the HML/A squadrons' traditional reconnaissance and surveillance capabilities because of their upgraded sensors and the VCR capabilities. However, the VCR does not record any other supporting information (e.g., geographic coordinates) beyond the basic imagery. Accordingly, helicopter aircrews will record concurrently an audio of the mission to make the tape more useful for post-mission debriefings and users.

Both helicopters, the AH-1W and UH-1N, can be employed in sections or as part of teams to scout ahead of friendly troops or to conduct visual and/or imagery reconnaissance of areas of interest, objectives, routes, and point targets, etc. Because each is vulnerable to ground fire and provides other critical support to the MAGTF (e.g., the AH-1W's fires capability; the UH-1N's C2 and utility capabilities), rarely will either be employed in a dedicated reconnaissance role. A more likely role for the AH-1W would be an armed reconnaissance mission as a function of offensive air support to deep air support operations. In such a mission the AH-1W would seek out and engage a given target set within a specified area, with a concurrent mission to collect intelligence data. Another likely mission for the AH-1W is armed interdiction, in which AH-1's would be deployed to engage a specific, known target and collect intelligence information.

Finally, both the AH-1W and UH-1N can be employed to conduct point or route reconnaissance missions of designated objective areas or by flying a route while video/FLIR recording to provide GCE, ACE or CSSE forces with a valuable early look at planned areas of operation.

All intelligence missions typically will be performed in addition to the primary missions of armed escort and rotary-wing close air support. During the conduct of any mission, both aircraft have a secondary mission of conducting aerial reconnaissance, and the aircrew would employ the NTS and NTIS to collect and store imagery data for post-mission follow-on analysis.

Tactical Photo

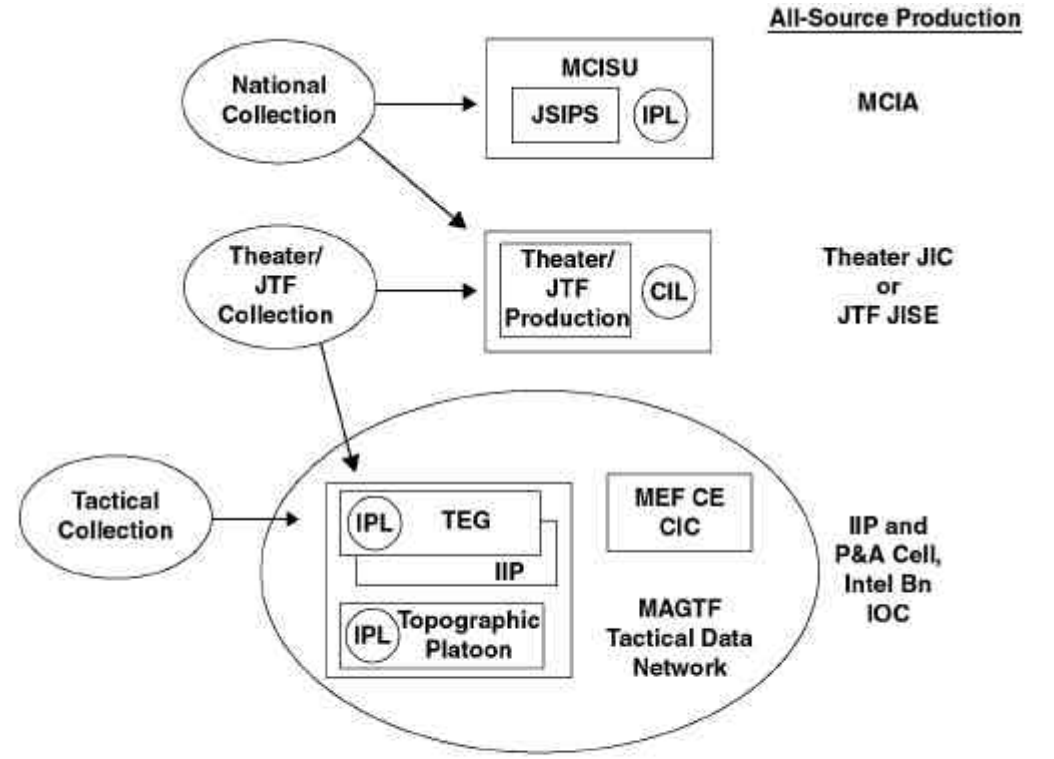
TACPHOTO is a digital camera system for units that normally return to base (i.e., flight crews, CI teams, and scout snipers.), and have the capability to download acquired images into other intelligence information systems for follow-on intelligence exploitation. TACPHOTO uses the same digital camera and a similar concept of employment as Manpack SIDS. It consists of a digital camera, three lenses, PCMCIA card hard drive and card reader, cables, and the imagery receive and manipulate software.

Imagery Processing, Exploitation, and Production Capabilities

The Marine Corps possesses a limited organic imagery processing, exploitation, and production capability. Access to national, joint, theater, and other-Service processing and production capabilities will therefore be important elements of the Marine Corps imagery architecture (see figure 4-16). The following provides descriptions of key IMINT processing, exploitation, and production information systems.

Joint Service Imagery Processing System National

JSIPS National, organic to the MCISU, provides exploitation and dissemination of national imagery to MAGTFs and other Marine Corps units (to include the supporting establishment). The JSIPS National receives, stores, and exploits digital NRT imagery from national and theater imagery collection platforms. It also displays imagery in softcopy format for immediate exploitation. JSIPS is a deployable system; however, it requires 46 pallets and ten 40-foot flatbed tractor trailers (one with air suspension) for ground transportation, one C-5 and one C-141 for air transportation, and a 10K forklift at either end for loading and unloading. With sufficiently robust communications, the MCISU functions in a split-basing mode from its U.S. garrison location in support of deployed MAGTFs. MCISU CIS, intelligence, imagery, and data base systems and requirements include



MCISU, which operates the JSIPS at Camp Pendleton, and the IIPs, which will operate the TEG in each MEF architecture, are the Marine Corp's principal imagery and IMINT processing and production facilities. Within the MEF, the principal all-source intelligence processing and production agency is the Production and Analysis Cell, Intelligence Battalion.

Figure 4-16. MEF Imagery Processing and Production.

defense message system, JWICS, SIPRNET, 5D imagery server or IPL, RMS, imagery exploitation software system (IESS) data base, and the NIMA Delivery System (NDS) (see figure 4-17).

Requirements Tasking and Imagery Servers. The RMS is the primary means by which the IESS data base receives exploitation requirements tasking. All exploitation requirements are submitted from the requesting organization to the RMS, the requests are validated by MCIA, then processed through RMS control for tasking to the MCISU's IESS data base for exploitation tasking. The IPL stores and disseminates all secondary imagery products. The IPL is accessed by external organizations via SIPRNET. A softcopy imagery product is usually archived to the IPL or the 5D server.

Data Base, Software Information. The IESS host data base maintains target and requirements data. Through DMS, it interfaces with the NDS to order national imagery that may potentially satisfy target requirements. Exploitation of a target is accomplished using an electronic light table (ELT) software package for imagery display and graphic annotation. The MCISU also has the ability to produce hardcopy imagery products through the use of its digital photo lab (DPL).

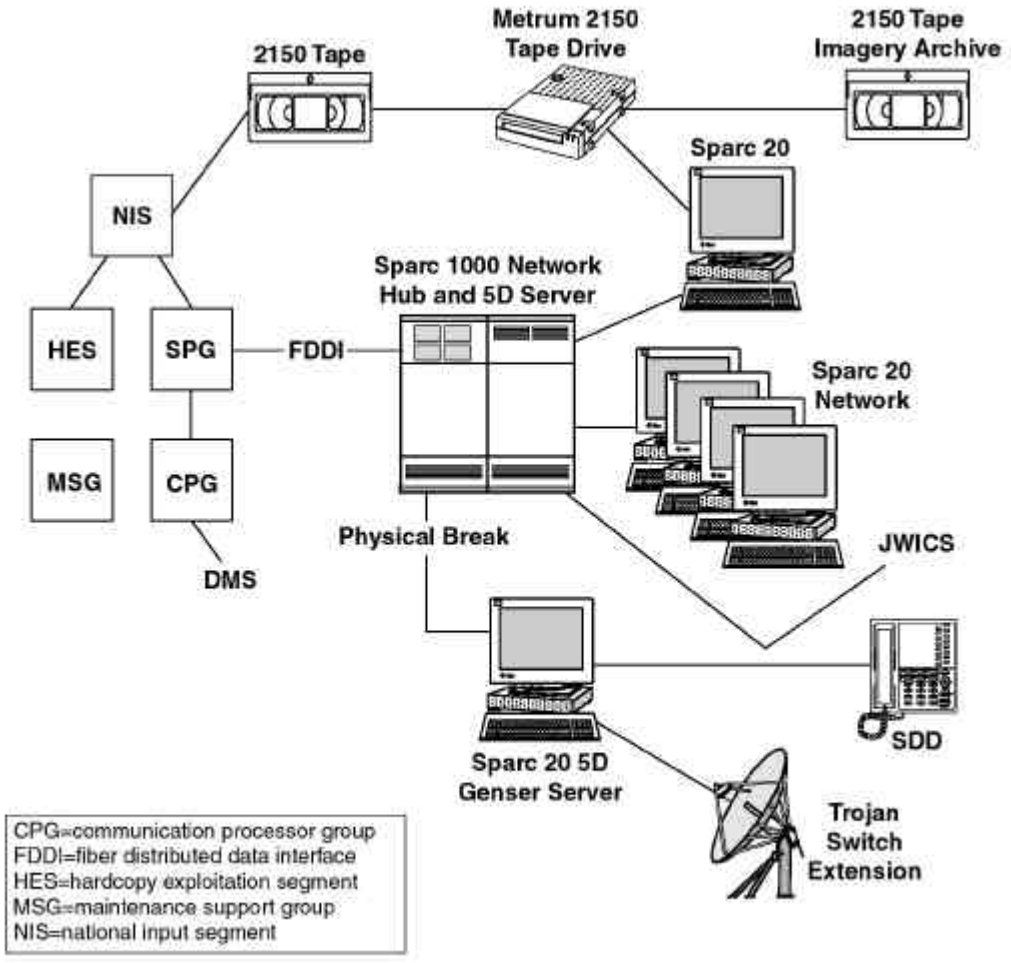


Figure 4-17. JSIPS National.

Configurations. The JSIPS National system can be configured in a variety of formations dependent upon location, mission, and other factors.

Garrison Configuration. While in garrison, the JSIPS National uses commercial power and the following leased communication circuits:

- One simplex 1.544 megabits per second (mbps) lease line to Fort Belvoir, VA (high-rate data to DE).
- One full duplex 56 kbps lease line to Fort Belvoir, VA (low-rate data to DE).
- JWICS connectivity.
- SIPRNET connectivity.
- One full duplex 2.4 kbps lease line to Fort McClellan, AL (DMS).

Full System and JSIPS Core Deployed Configurations. If deployed, the MCISU detachment will be dependent on the support command for communications and power support. Full system deployment will have the same operational capability as in garrison. In addition to the communications circuits listed for garrison configuration, the system requires a minimum of four telephone lines (two class A, two class B). Four MEP 007 generators (or equivalent) are required for power. These communications and power requirements also apply for deployed configurations of the JSIPS Core (complete system minus CIESS), where the number of workstations is reduced from eleven to three.

DPL Deployed Configuration. When the DPL is deployed independently, it requires a minimum of 128 kbps (512 kbps preferred) JWICS access for

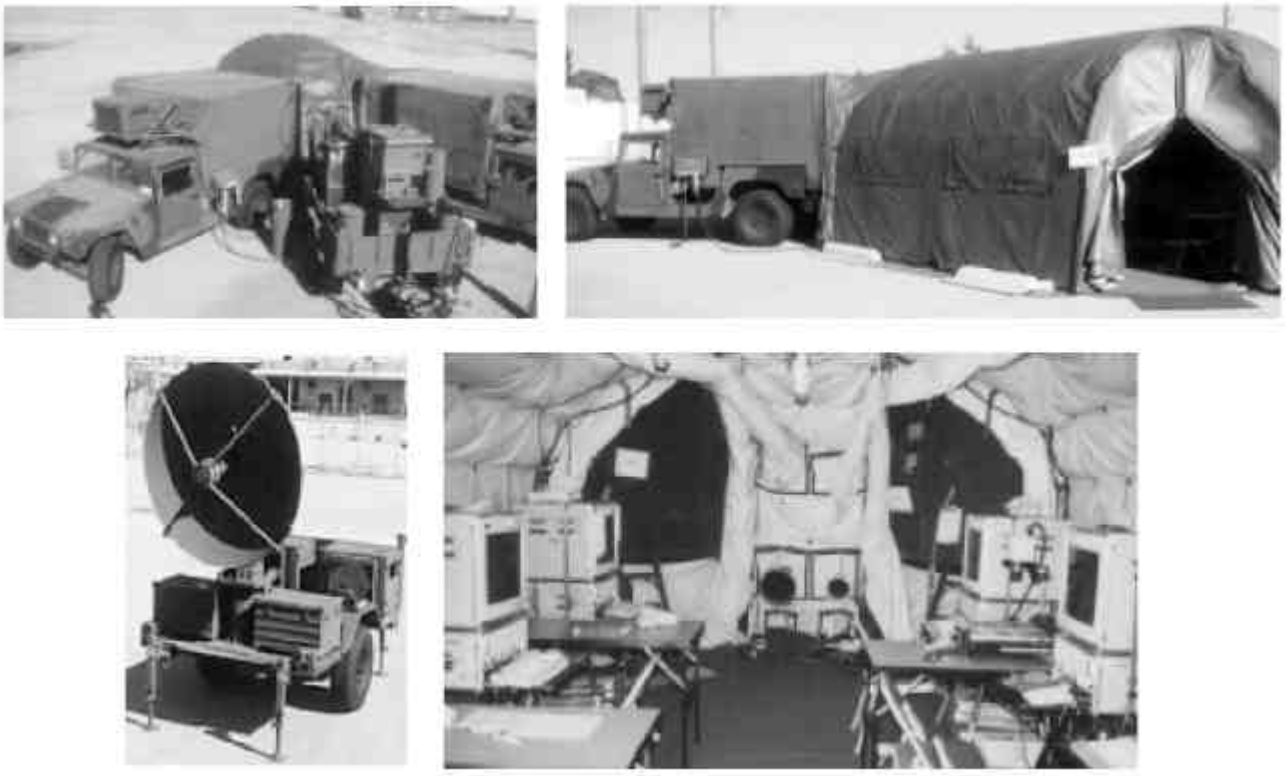


Figure 4-18. TEG Components.

communications connectivity back to the MCISU, and requires 20 kilowatts (kw) of power.

Tactical Exploitation Group

The TEG is a key MAGTF IMINT system and the only imagery exploitation and analysis tool available within the MEF. (Figures 4-18 and 4-19 depict major TEG equipment components and the CIS systems architecture.) It is organic to each MEF's intel bn's IIP. It is capable of receiving, exploiting, and producing imagery and IMINT products and reports. The TEG provides the capability to receive, process, store, exploit, and disseminate imagery, to include ATARS EO, infrared, and radar imagery; U-2 SAR imagery; and secondary imagery products from the MCISU and theater JIC/JACs.

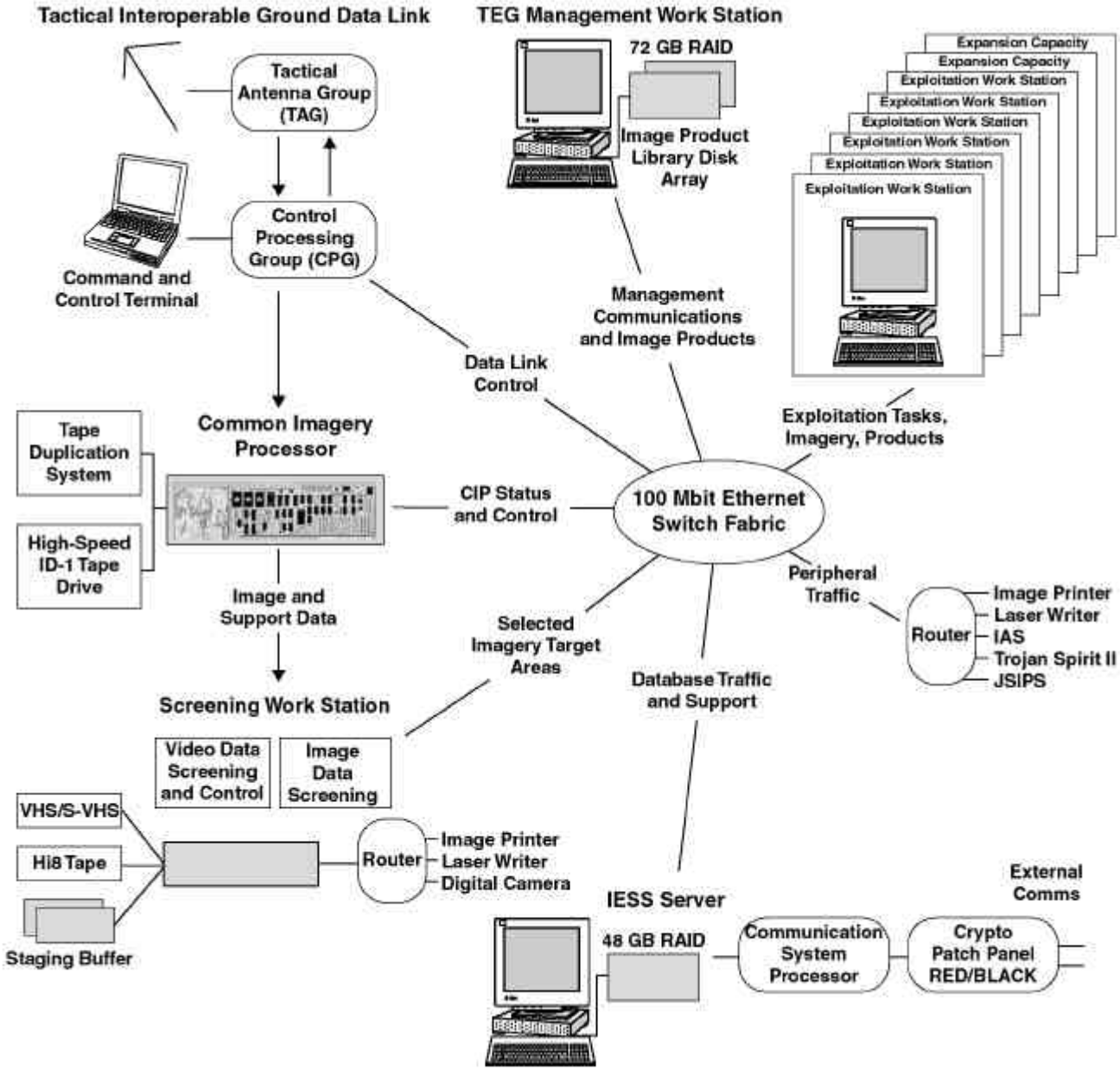


Figure 4-19. IIP/TEG Systems Architecture.

Additionally, the TEG's equipment suite provides the capability to exploit film-based imagery and output from digital cameras such as Manpack SIDS, and heads-up displays, FLIR, and gun camera tapes from various tactical aircraft. Once received, processed, and exploited, the imagery is then transmitted over available SIDS device(s), MAGTF TDN or other CIS resources. Upon fielding of the TIGDL CDL, NRT exploitation and processing of ATARS imagery will be possible; until then, imagery data tapes must be downloaded and disseminated to the TEG post-mission. Even with the TIGDL CDL, only selected priority images will be down linked; the remaining imagery data is stored on tape and downloaded following recovery.

The TEG is packaged in three HMMWVs and three trailers. Due to its weight and balance, the TEG requires additional external lift capability to move the IIP and TEB within the area of operations. This additional lift is not resident within the intel bn and must be provided either by the MEF headquarters group or some other external source.

Full operational capability of the TEG is anticipated to occur during fiscal year 2001. The initial operational capability TEG allows for the processing of F/A-18(R/C) mission tapes and data link and handles preprocessed national, U-2, UAV, and digital camera systems imagery. The full operational capability TEG provides interoperability with all Common Imagery Ground/Surface Systems (CIGSSs) baseline sensors (e.g., ATARS, Global Hawk) and handles all other preprocessed national imagery transmission format (NITF) imagery data.

Image Product Library

The IPL is the migration system to replace the legacy 5D System. IPL supports the storage and dissemination of imagery and imagery products, providing a library of information to imagery customers worldwide. IPL uses a standard Intelink or Intelink-S client to provide user access to this library, and supports both data push and data pull, via user profiling. The IPL stores imagery in NITF 2.0, TIFF, and other graphical formats.

Libraries are composed of three types: product, command, and national. The three types are differentiated by content, storage size, performance, and responsibility for operations and management. They are alike in that each type may contain digital imagery or digital imagery products from all sources including tactical, theater, national, civil, and commercial collection systems. All libraries share common digital imagery standards.

IPLs contain shared, restricted, or both types of imagery and imagery products required to support individual organizations. Each organization will determine the population of and manage its IPLs. The imagery and imagery-based products consist of tactical, theater, national, civil, and commercial imagery and imagery-based products. Most of the data stored on IPLs will be imagery products with the owner determining the mix between imagery and imagery products, the size of their IPLs, their interfacing

organizations, and the products requiring storage. NIMA will provide the update IPL management software. IPLs are based upon existing 5D capabilities, scaled for size and performance, and some are portable. IPLs support various levels of commands, CIGSS sites, and other organizations outside the command structure of the services requiring the use of libraries. When IPLs are integrated into the 17+ CIGSS ground station architectures, processed tactical imagery (still or motion) is fed to an IPL, acting as an imagery buffer, at the ground station. Stored imagery is then pulled or pushed to the exploitation workstations, exploited, then sent to the public access IPL for dissemination.

IPLs will be capable of importing, storing, exporting and managing imagery, image-based products, and associated metadata. IPLs have the capability to retain digital imagery data in on-line, near-line, and off-line storage media. Each IPL maintains a catalog populated with metadata of its imagery and imagery product holdings. The national IPL supports up to 1,300 image requests per day and up to 900 gigabytes (GB) for on-line imagery storage. The IPL should not take longer than 8 minutes to transfer a full frame (930 megabytes [MB]) national image to any requesting client (assuming fiber distributed data interface and no LAN contention).

Figure 4-20 provides a broad depiction of the services, applications, and scope within the IPL.

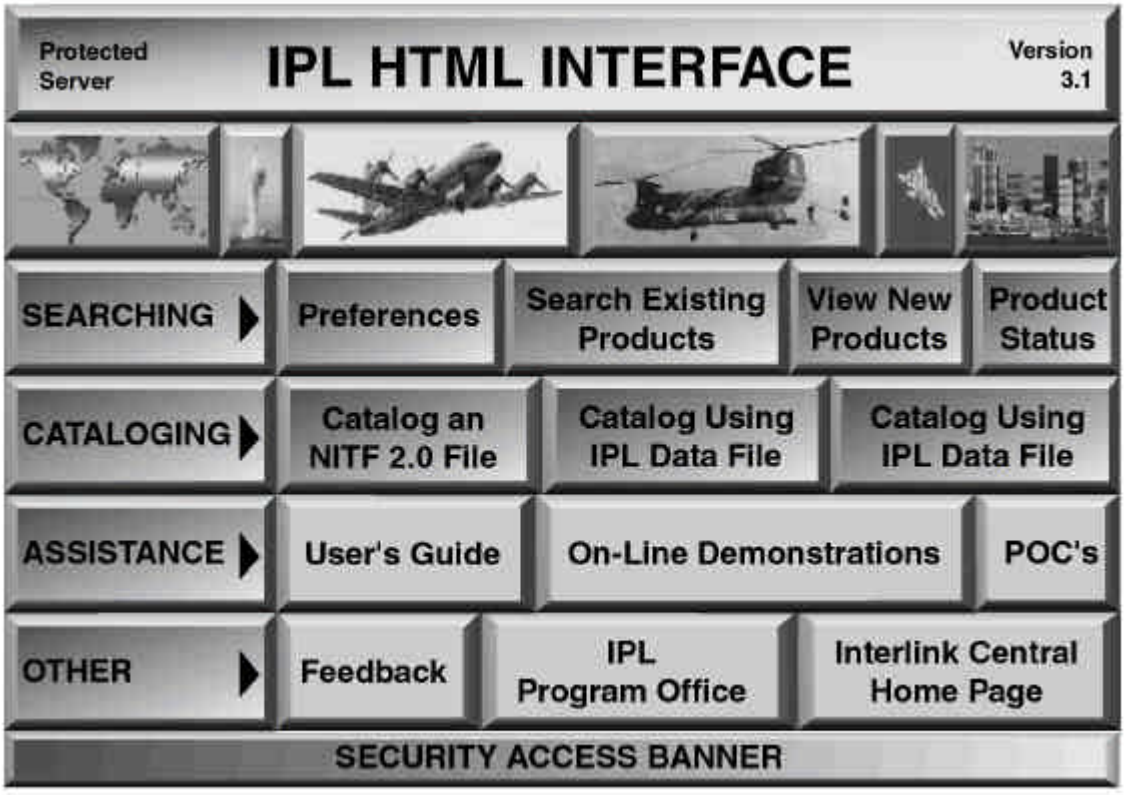


Figure 4-20. Image Product Library.

Imagery CIS Architecture

Figures 4-21, 4-22, and 4-23 on page 4-32 summarize the information discussed throughout this chapter and depict MCISU's CIS architecture supporting MAGTF, the internal IMINT CIS architecture for a MEF, and the broader IMINT CIS architecture through the theater and national levels.

4004. IMINT COMMUNICATIONS AND INFORMATION SYSTEMS PLANNING CONSIDERATIONS

The following identifies key CIS requirements and planning considerations in support of MAGTF IMINT operations.

- Ensure that the MAGTF CE, IIP elements, and other MAGTF units are included in the distribution of IMINT-related address indicator groups to receive pertinent JTF, Navy, theater, and national intelligence and IMINT products.
- Determine and coordinate radio net requirements, supporting frequencies, and operational procedures in support of IMINT operations (external to MAGTF, internal MAGTF, intelligence broadcasts, retransmission sites, routine and time-sensitive operations, etc.).

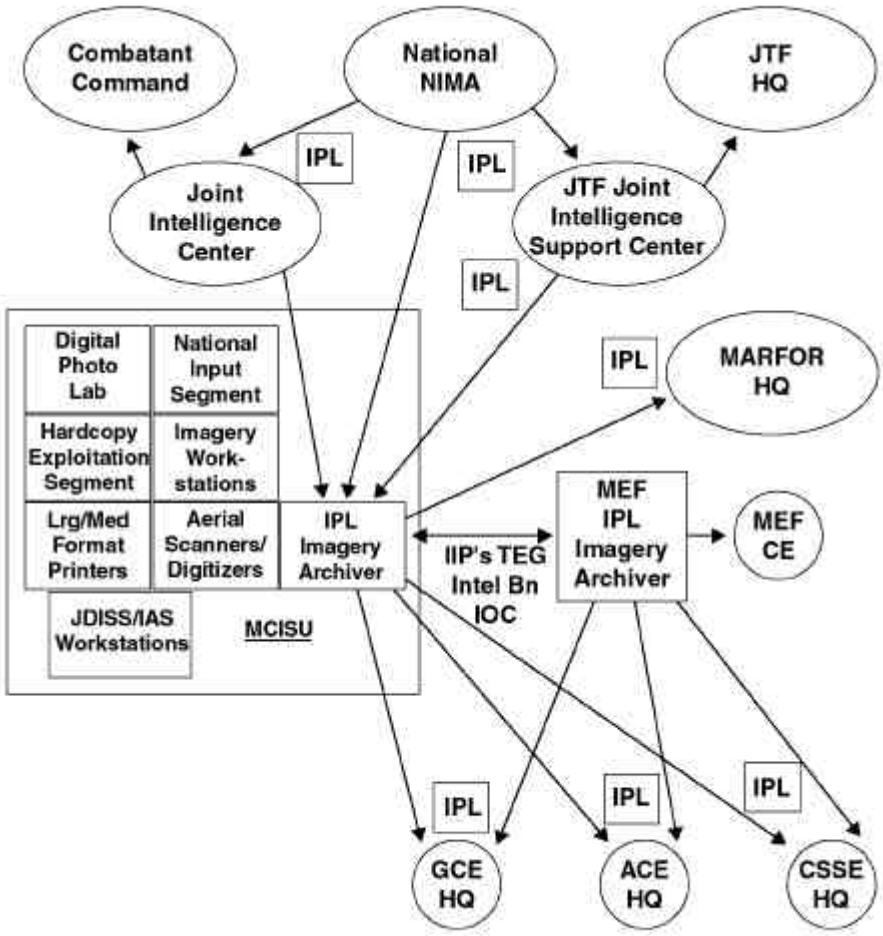


Figure 4-21. MCISU Support to Intelligence Operations (Notional).

- Coordinate IMINT CIS activation and restoration priorities and supporting procedures.
- Establish, operate, and manage unique IMINT communications requirements (e.g., with MCISU; for the J-STARS CGS).
- Identify and procure communications security materials system (CMS) requirements for unique IMINT communications.
- Determine and coordinate wire communications (to include telephones) supporting IMINT operations.

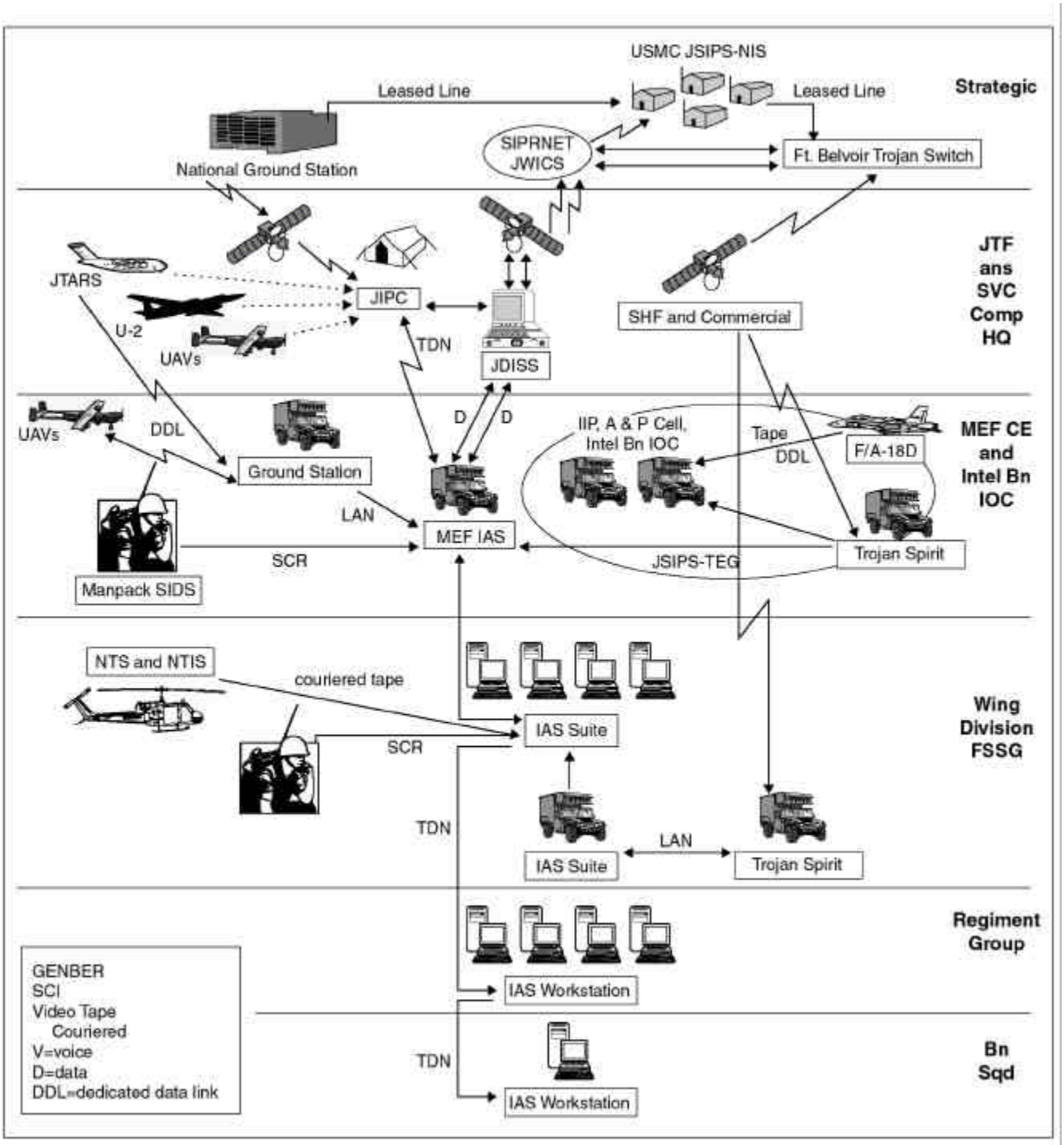


Figure 4-22. MEF Internal Imagery CIS Intelligence Architecture.

- Determine and coordinate LANs and WANs and unique intelligence network information systems requirements in support of IMINT operations (hardware, software, internet protocol addresses, etc.).
- Integrate MAGTF IMINT elements' CIS operations with those of other MAGTF and pertinent JTF and other components intelligence and reconnaissance units (mutual support, cueing, etc.).

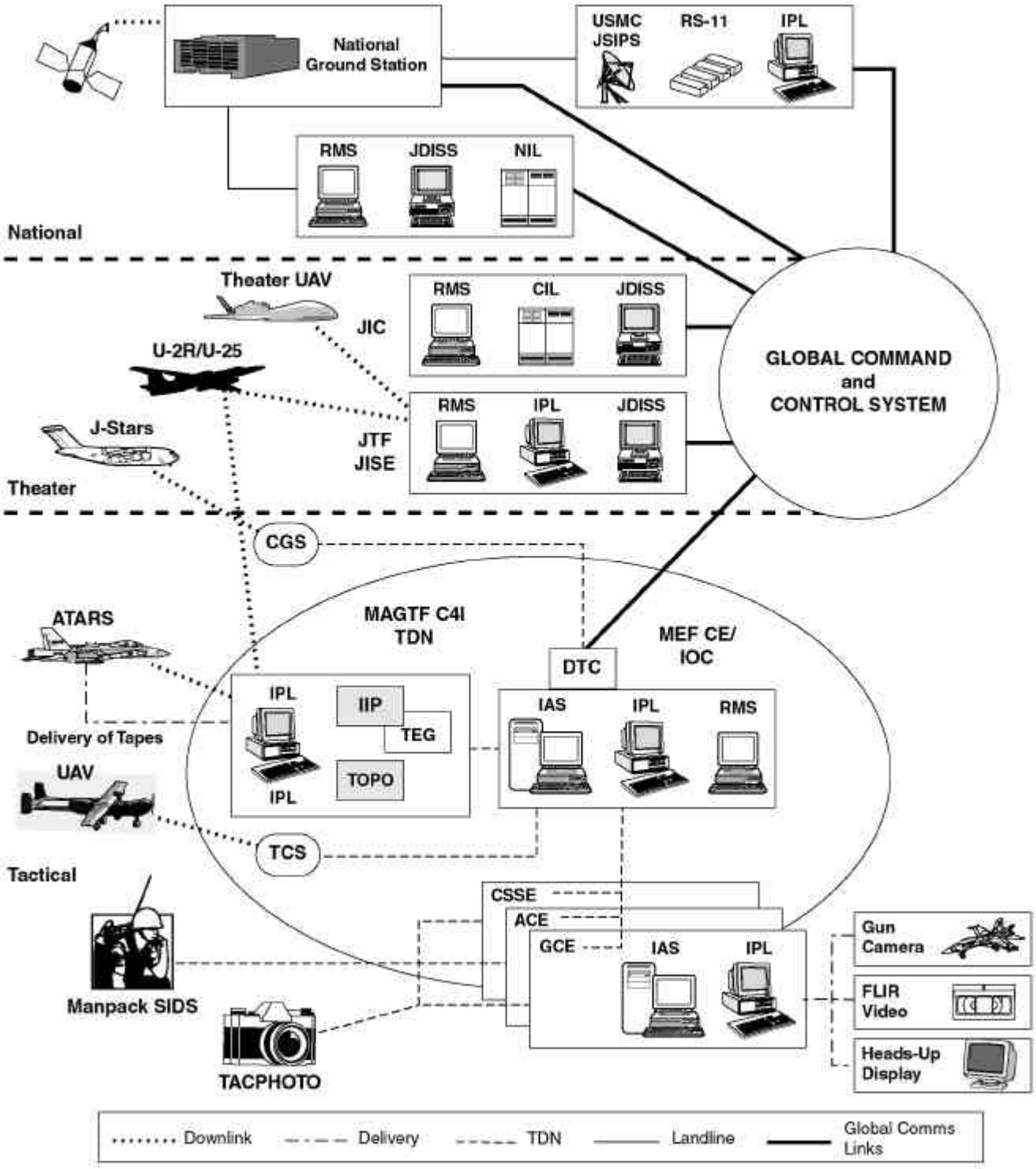


Figure 4-23. MEF through National IMINT CIS Intelligence Architecture.

- Integrate CIS of IMINT elements employed in general support with collocated GCE, ACE, CSSE, and other MAGTF elements (e.g., integration of UAV squadron RRS with supported GCE units to provide time-sensitive reporting, coordination of maneuver).
- Coordinate MAGTF IPL and Manpack SIDS administration and operations.
- Coordinate IMINT CIS and collection, production, and dissemination operations and procedures with other services', allied and coalition forces' IMINT and all-source intelligence operations.